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Claremont McKenna College

**Sibling Mediated Play Intervention of Joint Engagement and
Symbolic Play in Children with Autism Spectrum Disorder**

Submitted to:
Dr. Marjorie H. Charlop

By:
Catherine R. Callaci

For:
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Table of Contents

Abstract	3
List of Tables	4
Introduction	5
Autism Spectrum Disorder & Its Symptoms	5
Play Deficits in ASD	7
Importance of Joint Engagement & Symbolic Play	9
Therapies for Individuals with ASD	10
Sibling Interventions in ASD	12
Sibling Interventions for Play & Social Behaviors	13
Method	16
Participants	16
Settings & Materials	16
Procedure	18
Design	18
Sibling Training (Part 1)	18
Sibling Intervention (Part 2)	18
Dependent Measures & Scoring	18
Predicted Results & Discussion	19
References	24
Tables	29
Table 1. Participant Characteristics	29
Table 2. Behavioral Skills Training Guide	30
Table 3. Behavioral Skills Training Criterion	33
Appendices	34
A. Informed Consent Form	34
B. Sibling Implementation Checklist	36
C. Coding Sheet for Joint Engagement & Symbolic Play	37

Abstract

The study will utilize a multiple baseline design to assess a sibling mediated play intervention using Behavior Skills Training (BST) to increase joint engagement (JE) and symbolic play (SP) behaviors in children with autism spectrum disorder (ASD). JE will be operationalized as turn-taking, imitation, or following through on verbal commands to play. SP will be operationalized as play actions with objects for imaginative uses, without the actual objects present, or labeling abstract properties of the object. Six siblings of children with ASD will be taught BST during playtime. JE and SP occurrences will be scored via a 15 second partial interval procedure for 5-minute play sessions. It is predicted that after intervention, children with ASD would exhibit more instances of JE and SP play than in baseline.

List of Tables

Table	Page
1. Participant Characteristics	29
2. Behavioral Skills Training Guide	30
3. Behavioral Skills Training Criterion	33

Sibling Mediated Play Intervention of Joint Engagement and Symbolic Play in Children with Autism Spectrum Disorder

Autism Spectrum Disorder & Its Symptoms

Since the start of the twenty-first century, ASD has dominated headlines due to its unknown cause and lack of a cure. According to the most recent estimate of the Center for Disease Control and Prevention (CDC), about 1 in 54 children have been identified with ASD in the year 2018. This population represents all racial, ethnic, and socioeconomic groups, as ASD occurs across demographics. Coined in 1943 by Leo Kanner, the phrase 'autism' comes from the Greek word 'auto' meaning the self, as the 11 children Kanner observed had significantly different social tendencies than typically developing children. A year later, Hans Asperger identified a similar disorder, naming it after himself, Asperger's Disorder, consisting of an inability or difficulty in social relationships and interaction (Durand, 2014). These initial observations laid the foundation for what we know of now as Autism Spectrum Disorder according to the Diagnostic and Statistical Manual of Mental Disorders (2013).

Autism Spectrum Disorder is a life-long disorder that affects the individuals, their families, school systems, and communities drastically, as costs and resources for treatment increase in demand. The expensive nature of ASD services and special needs programs can bankrupt families, averaging between \$40,000 to \$60,000 a year for intensive applied behavior analysis (ABA) therapy alone (Amendah, Grosse, Peacock, & Mandell, 2011). Despite the financial burden, families with ASD must find ways to manage and adapt to the challenges connected with ASD. Developmental psychologists have urged parents to look for symptoms starting around the first birthday, as early

intervention has been found to be predictor of treatment responsivity, along with specific participant characteristics (Paynter, Trembath & Lane, 2018). Commonly known symptoms of ASD range from abnormalities in eye contact, difficulties adjusting behavior in different social settings and lack of interest in peers. Clinically, individuals with the disorder demonstrate significant impairments throughout development, including persistent deficits in social communication and interaction, restricted and repetitive patterns of behavior or interests not attributed to intellectual disability (American Psychiatric Association, 2013). Though there are no physical abnormalities associated with ASD, many people identify individuals with autism through social interaction. For example, some individuals on the spectrum will not understand the implications of sarcasm or irony, instead perceiving the meaning as literal (Persicke, Tarbox, Ranick, St. Clair, 2013). Other individuals may experience difficulty in expansion of conversation and spontaneity of responses.

From the name itself, we view ASD as a spectrum, meaning that individuals diagnosed with the disorder vary greatly in severity. Specifically, some individuals develop relatively typical language skills, whereas others may only develop partial speech or irregular speech patterns such as echolalia (the repetition of speech that was just said by another individual). Adults and children with ASD also fluctuate in their intellectual ability, as many people diagnosed with Asperger's Disorder (AD), known in the clinical community now as high-functioning autism, exhibit average or advanced levels of IQ. Because of the range of symptom severity and areas of deficits, general treatment for individuals with ASD is an ongoing journey for clinicians as certain techniques produce great social improvements while leaving others unaffected. Though

there is no known cure of ASD, the majority of researchers argued that it is genetically based. It is unclear whether or not there is an environmental component that interacts with the genetic predisposition of certain individuals. However, due to the rise in cases of ASD and similar neurodevelopmental disabilities, there has been a surge in research for the treatment rather than for the cause of ASD.

Play Deficits in Children with ASD

Signs of difficulty in social communication can be seen earlier in childhood through observation of individuals with autism spectrum disorder and their play. In observation of play across three groups, TD (typically developing children), DD (developmental delayed) and ASD (children with autism spectrum disorder), there were significant differences between the children with ASD versus the other two groups. For example, children in the ASD group exhibited significantly fewer total touches of toys, restricted variety of toys touched, and limited symbolic play (Pierce, 2013). Conversely, the children in the ASD group demonstrated the highest frequency for exploratory play out of the three groups, with a mean proportion of about 60%. This finding is paralleled in a similar study (Rutherford, et al., 2007) in which high mean proportions of exploratory play are found in children with ASD, leading to much lower mean proportions of symbolic and functional play.

A possible explanation for the differences in children with ASD may be linked to each play's general requirements. Individuals with ASD may struggle with symbolic and functional play that requires role-playing, imagination, and dynamic topics of conversation because of the very qualities of ASD (MacDonald, Sacramone, Mansfield, Wiltz, & Ahearn, 2009). The repetitiveness and rigid nature of both their thoughts and

words could hinder their ability to switch settings and toys, resulting in less exposure to other toys, as seen in Pierce (2013). Similarly, lack of spontaneous speech could inhibit imagination and limit potential play scenarios.

As seen in the previous literature, children with ASD have severe difficulties specifically in reciprocal play with others. Notably, their play lacks imagination (Baron-Cohen, 1987). This lack of imagination may be one of the critical deficits in play, leading to impaired ability to develop relationships with peers of similar age and development. Because of the numerous components of social communication deficits in individuals with ASD, this study attempts to target just two behaviors that will contribute to improved play.

According to developmental psychologists, there are multiple types of play. For example, world renowned psychologist Jean Piaget argued that there are four main types of play such as functional play, constructive play, symbolic play, and games with rules. Symbolic play, often referred to as imaginative or mature play, is sometimes seen as the most difficult pillar of play, as it involves abstract thought, behavioral regulation, imagination and perspective taking (Johnson, Christie, & Wordle, 2005). These different types of play utilize separate ways of generating speech and action, the symbolic play usually being more difficult for children with ASD as it requires non-physical, abstract thought (Thiemann-Bourque, Johnson, & Brady, 2019). By understanding the nuances of play, it will be easier to comprehend why the social deficits associated with ASD are especially detrimental in symbolic play and collaboration with other play partners.

Importance of Joint Engagement and Symbolic Play

Joint engagement and symbolic play are two types of play that children with ASD exhibit deficiencies. Joint engagement has been defined in previous literature as the ability to play with others, including actions like eye contact, imitation, and responding to commands (Ferraioli & Harris, 2009). Often called 'joint attention' by researchers, joint engagement has a tremendous impact on the play abilities of a child, especially when it is deficient. Specifically, higher-order supported joint engagement (HSJE) has been linked to reciprocity in play for children with ASD, involving child's acknowledgement of play partner's interaction as opposed to lower-order supported joint engagement in which there is little to no awareness of a potential play partner. In a recent study (Bottema-Beutel, Yoder, Hochman & Watson, 2014), researchers found that only HSJE is able to predict later social communication, critical for development. This finding is very relevant to proponents of play therapy. In order to obtain the desired end (healthy social development), it is instrumental that children with ASD develop higher-order supported joint engagement skills that facilitates collaboration with a play partner, rather than parallel play.

Shifting to the second target behavior, symbolic play has been defined as the ability to use abstract thought while playing by completing actions that use objects for their imaginary purpose and pretending objects are present and engaging with them although they are not in the physical environment (Lee, Xu, Guo, Gilic, Pu, & Xu, 2019). An important distinction to make is between this concept of symbolic play and another common form: functional play. Although many studies of child development operationalize the terms are equivalent, Leslie (1987) argues the nuance that a child's

ability to understand an object's functional use is a separate skill than the understanding of an object's pretend use, involving imagination and elaboration. Children with ASD have been able to acquire symbolic play skills through behavioral interventions such as object-substitution symbolic play (Lee, et al., 2019). In this treatment, children with ASD and their mothers were instructed in their natural environment with an intra-verbal training system that resulted in increased symbolic play, providing new play actions as well as the instructor-modeled play actions from training. However, generalization of this symbolic play skill was only found in one out of the five participants, a common pitfall of this treatment style.

Therapies for Individuals with ASD

Based on learning and operant conditioning principles, ABA has become the default treatment of people with ASD. Influenced by the initial research of Lovaas (1987), ABA is an adult-driven approach that works to alter specific antecedent-behavior-consequence chains through multiple trials of conditioning and reinforcement. Often token economies are implemented, reinforcing positive behaviors through the administration of a 'token' like a star or sticker that can later be exchanged for a primary or secondary reinforce such as candy, juice, and other preferred items. This approach has been found to be time-consuming as well as expensive, but one of the few empirically supported treatments and thus the most frequently used intervention. ABA can be a successful tool to extinguish problem behaviors such as hitting, biting, yelling, and tantrums, as well as increase frequency of prosocial behaviors such as taking turns, social communication and joint engagement. This approach can even be effective for decreasing the food selectivity of children with ASD, a recurrent issue for those on the

spectrum as rigidity in behavior is one of the core symptoms of ASD (Peterson, Piazza, Ibañez, & Fisher, 2019). Results from this study show efficacy of the ABA procedure as an increase in independent acceptance of 16 healthy, non-preferred target foods among children with food selectivity and ASD in the ABA condition, as compared to no increase for children with ASD in the control condition.

Related to ABA, behavioral play interventions and social skills training (SST) have been at the forefront of ASD treatment for the past twenty years. These programs are traditionally group-centered, teaching social skills like smiling, turn taking, eye contact and conversational skills (Kwon, Kim, & Sheridan, 2012). These groups often use a more structured implementation of play skills. Chester, Richdale, & McGillivray (2019) compared the effects of presenting social skills training in either a semi-structured play environment versus an unstructured play environment (as well as a third group providing the control on the waitlist). After analysis of posttreatment behavioral measures in each condition, significant differences were found as the semi-structured play environment resulted in positive change in both social skills and social competence. The semi-structured condition also indicated treatment gains were maintained at follow-up, across informants, providing support that the effects of SST had transferred into additional settings.

The current study will utilize an aspect of ABA and SST called behavioral skills training (BST). Using this model, the principal investigator will enable the siblings to teach the children with ASD through implementation strategies such as verbal instructions, modeling, rehearsal and feedback during multiple training sessions. Application of BST has produced positive outcomes in previous research studies through

increased social communication, eye contact, and other prosocial behaviors (Stewart, Carr, & LeBlanc, 2007). Similarly, BST has been executed in order to promote maintenance and generalization of social skills over time (Hui Shyuan Ng, Schulze, Rudrud & Leaf, 2016).

Sibling Interventions in ASD

Because this study investigates the efficacy of siblings acting as the behavioral interventionists for their siblings with autism, it is imperative that the preceding studies be analyzed. Starting in the 20th century, Cash & Evans (1975) found that neuro-typical siblings could be effective interventionists with their siblings with ASD. The use of siblings in ABA interventions ranges from language acquisition to decreased stereotypy, as well as increasing play and social behavioral. Researchers continued to find that the siblings of children with ASD could provide behavioral interventions that were reliable (Colletti & Harris, 1977).

Unfortunately, there are not a significant amount of sibling mediated interventions targeting play skills such as joint engagement and symbolic play. This gap in the literature provides the opportunity for the present study to be highly impactful in the growing subfield of the family approach to autism treatment. One study used siblings as the interventionists to deliver the Natural Language Paradigm (NLP). NLP implements a combination of play and language production through turn-taking, task variation, and the use of preferred toys to encourage speech. Improvements in speech production and frequency were found for two out of the three boys with ASD, meeting their criterion and all siblings were able to administer NLP efficaciously (Spector & Charlop, 2017). Similar results were found in a study by Ferraioli & Harris (2009) in which siblings were

effective mediators at establishing joint attention with their siblings with ASD. These findings suggest that siblings of children with ASD have the potential to be effective and reliable social skills and play interventionists, shaping behaviors and influencing social development.

A comprehensive review of some of the major studies of sibling mediated interventions for children with ASD has found mixed results, adding to the complexity of this method (Shivers & Plavnick, 2015). It was identified that the role of the sibling in the intervention may determine the effectiveness of the intervention itself. Specifically, they divided their literature review to studies in which the siblings were co-recipients of the intervention as opposed to when the siblings were the agents of intervention (behavioral interventionists, as in the proposed study). Walton & Ingersoll (2012) found that despite all six siblings exhibiting increased levels of contingent imitation strategies, with four maintaining higher than baseline levels throughout the entirety of intervention, the siblings did not continue this trend after the discontinuation of the study. Researchers argued to continue consistent parental reinforcement of the siblings' implementation strategies posttreatment in order to maintain positive results for the child with ASD. Specifically, they argue that continued practice of such skills will lead to heightened skill maintenance and optimal effects in social development of the child with ASD.

Sibling Interventions for Play and Social Behaviors

Regarding play and social behaviors, Ferraioli & Harris (2012) identified numerous advantages of sibling inclusion in this therapy process. First, they found that in posttreatment interviews, many of the siblings indicated feeling more comfortable interacting with their sibling with ASD, as well as more willing to initiate play with their

sibling. Prior to intervention, many siblings of children with ASD reported feelings of frustration when attempting to interact, leading to isolation and avoidance. Parents also completed a posttreatment survey, noting their children's higher willingness to play together, as well as increased self-confidence of the neuro-typical sibling.

In one sibling mediated play intervention, researchers found that after sibling training, four children with ASD demonstrated significantly higher rates of joint attention during observed time as compared to baseline (Tsao & Odom, 2006). One child increased his rate of joint attention from 7.3% in baseline to 47% in observed time, suggesting intervention effects from sibling training. These findings, however, are contrasted with the maintenance data, in which each of the four participants with ASD and their 'nondisabled' siblings exhibited fewer rates of joint attention, as well as other behavioral measures like spontaneous social behavior.

Another sibling mediated play intervention observed that utilizing Pivotal Response Training techniques was effective in promoting social and play behaviors in siblings with ASD (Sullivan, 1999). These results were similar to those of a study using behavioral training, or in other words, behavioral skills training. Schreibman, O'Neill, & Koegel (1983) conducted some of the early sibling mediated play interventions, finding that the siblings were able to use the behavioral training in order to learn new skills to teach their siblings. They also found that after intervention, the siblings had a more positive relationship with their siblings with ASD, measured by fewer negative remarks and a greater frequency of initiations to play with the sibling. These additional benefits involving the emotional relationship between siblings is critical to healthy developing for both the child with ASD and their neuro-typical siblings.

In a sibling mediated intervention focused on social skills, Celiberti & Harris (1993) found that through their program, the children with autism increased their social play behaviors and at the same time, the siblings increased their occurrences of praise, reinforcement, and commands (the essentials of BST). Issues in maintenance and follow-up of positive results are consistent in sibling intervention studies.

Consequently, this study will be designed to address some of the shortcomings in the existing literature surrounding sibling mediated play interventions. As seen in the preliminary studies, there is a high demand for replication of sibling implementation in order to gain validity. When using behavioral skills training techniques (such as instruction, modeling, rehearsal, reinforcement and feedback), with a family-oriented approach to treatment, it is predicted that children will be able to improve their targeted social skills, thus increasing social communication, strengthening interpersonal relationships, and enriching the lives of the entire family.

The present study is designed to expand previous literature on sibling mediated play intervention by implementing BST to teach the siblings of boys and girls with ASD to play together in the home. Similarly, this study is meant to target two social play behaviors: joint engagement and symbolic play which will enable the children to play more appropriately with their siblings and peers at school. In essence, this study is created to aid families of children with ASD by empowering the siblings to teach and encourage those with ASD by improving play and strengthening relationships.

Method

Participants

Six children diagnosed with ASD from a professional (pediatrician, psychiatrist, psychologist) and their neuro-typical siblings will be recruited from the Claremont Autism Center to participate in this study, with consent granted from their parents (see Appendix A). Assent will be granted from both the children with ASD and their siblings. Of the target children (those diagnosed with ASD), five participants will identify as male and one participant will identify as female. Of the sibling participants, all of them will identify as female. The names of the target children and their corresponding sibling will be altered to secure their privacy. No monetary compensation will be granted for participation in this study. All participation will be voluntary. Parents and legal guardians, siblings, and target children will be briefed at the beginning of the experiment. For more details on each participant, please see Table 1.

Settings & Materials

All sessions will be held at the Claremont Autism Center, which all of the dyads have been visiting weekly for at least the past three years, so the settings within the Center will be familiar to the dyads. Children will complete baseline, generalization probes, training, and intervention in observation rooms that they usually play in during their time at the Center. Toys will be selected based on preference and appropriate developmental level. Each dyad will be presented a large bin of toys on the table, allowing the children to choose which of the toys to engage with. Sessions will be recorded on an iPad for coding of target child's play behaviors.

Procedure

Design

A multiple baseline design across participants will be used with a multiple probe design within participants across play behaviors (joint engagement and symbolic play). The study will employ dyads, a two-child group consisting of the child with ASD (target child) and their sibling. There will be two parts to the procedure: sibling training (Part I) and sibling intervention with target child (Part II). The trainer of the siblings (first author) will be an undergraduate student with over five years of clinical experience working with children and adolescents with ASD.

In order to determine if the play behaviors are generalized beyond sibling interaction, the target children will be observed in generalization probes with a peer who is NOT their biological sibling, including other participant's siblings or other participants themselves. Generalization information will be gathered at baseline, before implementation of the sibling intervention. After intervention is complete, generalization information will be obtained with the same play partners as in baseline to maintain consistency.

Generalization probes will be scored identically to the baseline and intervention sessions, using fifteen second interval scoring, followed by a calculation of intervals in which the behavior occurred divided by the total number of intervals.

Sibling Training (Part I)

To train the siblings, the principal investigator will teach BST and model three examples of joint engagement, symbolic play, and reinforcement techniques. A step-by-step guide of administration of BST can be found in Table 2. After these are demonstrated, the investigator and the siblings will participate in a role-playing scenario so that the sibling

can exhibit modeling and reinforcing behaviors twice as according to the Sibling Training Session and Criterion (see Table 3). All sibling training sessions will be recorded and later coded to ensure that the sibling reaches criterion before advancing to intervention.

Sibling Intervention (Part II)

Once the siblings reach training criterion, they will present the BST to their sibling with ASD. Each intervention session will be a 5-minute play task, identical to the baseline condition, and video recorded by an undergraduate with an iPad for later coding. To determine that the sibling is reliably implemented the target behaviors, each 5-minute video will also be scored on a checklist of whether the siblings followed the hallmarks of BST: instruction, modeling, rehearsal or 'role-playing' and feedback (see Appendix B). If the sibling does not demonstrate or attempt to demonstrate at least one instance of symbolic play and one instance of joint engagement during the intervention session, an additional training session will be implemented before the next intervention following the same protocol as the original training session to ensure that the target child receives reliable intervention via the sibling.

Dependent Measures & Scoring

Each 5-minute iPad video will be scored by a coder, using fifteen second interval scoring, to determine whether or not an instance of the target behaviors, joint engagement and symbolic play occurred (see Appendix C). The percentage of occurrence will be calculated by dividing the number of fifteen second intervals in which joint engagement occurred by the total number of intervals (twenty). The same calculations will be done for the behavior of symbolic play. To ensure inter-rater reliability, 33% of the videos will be

coded by both the first author and an undergraduate research assistant, with a standard of at least 90% inter-observer agreement (IOA).

Predicted Results & Discussion

The current study will use a multiple baseline design in order to account for the variability within each participant's baseline. The dyads will be randomly selected to determine how many baseline sessions are required. The operationalized definition of reaching criterion in this study will be such that intervention persists until the target child (the child diagnosed with ASD) doubles their instances of joint engagement and symbolic play from baseline levels, after receiving BST from the sibling mediated play intervention. Once the child doubles their levels of the target behaviors and maintained it for at least two separate sessions back-to-back, the dyad will be finished with the intervention phase. It is predicted that for the dyads to reach criterion, there will most likely need to be multiple sibling training phases correlated with the siblings' cognitive and developmental level. Based on the previous literature, it is suggested that the research hypothesis will be supported in the current study, suggesting that all six dyads will double their instances of joint engagement and symbolic play after the sibling mediated play intervention of BST for at least two sessions in a row.

Investigation into the family relationships in households with children with ASD are crucial to understanding how to improve social functioning in those diagnosed on the spectrum. Because siblings are natural play partners, consistently spending time together in the home and interacting in the same environment, it is important that siblings become integral agents in the treatment of ASD. The current study will be a relevant example of

the positive consequences that can result from sibling interaction on the social functioning and play skills of children with autism spectrum disorder (Ferraioli, Hansford, & Harris, 2012; Tsao & Odom, 2006; Walton & Ingersoll, 2012). Any improvement in the social abilities of children with ASD is excellent, however, advancements via a sibling mediated play intervention may result in sustained improvements that can generalize across play partners and environments. It is possible that involvement of siblings in the treatment and therapy of children with ASD will not only improve the familial relationship, but also long term social functioning of those on the spectrum while decreasing the emotional and financial burden on the parents and caretakers.

Taking the study's effects a step further, enhanced development of social skills in children with ASD could relieve some of the burden on community centers and schools, as well as improve the stigma associated with ASD. If siblings are able to learn to productively, and happily, play with their siblings with ASD, it is likely that they will involve their neuro-typical friends and classmates, thus spreading acceptance as well as increasing the generalizability of the study. With all autism research, the end goal is to provide empirically based, thoughtful treatment to those families with ASD by advancing the capabilities of the child themselves, the family's resource, and the community's understanding of the disorder.

Similar to other behavioral interventions, the sample size (N=6) will be small, not allowing for broad generalizability. In order for the results of this study to be more generalizable, the procedure would have to be replicated on a larger scale, perhaps across multiple treatment organizations to accumulate a larger population. Another crucial

restriction of this study is the amount of play behaviors measured. The current study focuses on the specific play behaviors of joint engagement and symbolic play. In order to widen the impact of sibling mediated play intervention, future researchers should consider expanding to other play behaviors, including functional play, social communication, and rule-following behavior.

Another direction for future researchers is in the transfer of skills into other environments besides play. One important question to ask is: will individuals with ASD who have received effective sibling interventions be more successful in creating interpersonal relationships with their peers? Based on previous literature, because children build social relationships through play, it is logical to expect children who are deficient in play, such as those individuals with ASD, to have less social relationships leading into adolescence. If we are able to intervene during children through the use of sibling mediated play intervention, those children with ASD will be provided extra practice in their play skills, allowing them to improve to the point where they can successfully interact with their peers outside of the home (such as in school and daycare), enabling the growth of social relationships.

Relatedly, can the relationship between siblings have a mediating effect on making friends in school or outside of the home? If early intervention provided by the siblings is able, as previous literature as shown, to improve social functioning and social communication in individuals with ASD, then it is likely that this positive relationship, formed through the siblings and children with ASD interacting together, will model appropriate what it is like to have an appropriate friendship, leading to an increased

likelihood that those with ASD may form genuine connections with their non-familial peers later in life.

This study would also provide essential treatment to all families impacted by the COVID-19 stay at home orders. Because of the virus, the United States has ordered families to shelter in place during the pandemic, therefore prohibiting ABA therapists and behavioral interventionists to enter the home and engage with the family. Without the biweekly treatment from ABA specialists, many children with ASD risk falling behind in their linguistic, social, emotional, and intellectual progress that has taken months, sometimes years, to achieve. If the proposed study were to be implemented, there would no longer be a loss of treatment during the shelter in place orders. If the siblings were able to provide play interventions to their siblings through this simple yet effective BST, then the children with ASD would continue to progress, learning critical social behaviors such as turn-taking, imagination, verbal communication, and symbolic play. This intervention would not cause a drain on financial resources to the families either, as the siblings would be reinforced directly from interacting with their sibling, whereas ABA therapists have to be compensated heavily.

After the COVID-19 pandemic subsides, these families would re-enter the community stronger than before, as their children would have better understanding of each other by spending extended time together playing and learning from one another. Parents would have some stress alleviated as the older siblings would take over the childcare role, allowing for adults to focus on providing for their families through working at home. In essence, this is the perfect time to enact a sibling-mediated play intervention for children with ASD. The benefits would range from improved play

behaviors, to stronger emotional connections between siblings, as well as decreased stress levels among parents of special needs children. No child deserves to fall behind during this pandemic, and the proposed sibling play intervention will allow families to continue to prosper and adapt to the unique challenges of living with autism spectrum disorder.

References

- American Psychiatric Association. (2013). Neurodevelopmental Disorders. In *Diagnostic and statistical manual of mental disorders* (5th ed.)
<https://doi.org/10.1176/appi.books.9780890425596.dsm05>
- Amendah, D., Grosse, S.D., Peacock, G., & Mandell, D.S. (2011). The economic costs of autism: A review. In D. Amaral, D. Geschwind, & G. Dawson (Eds.), *Autism spectrum disorders* (pp. 1347-1360). Oxford: Oxford University Press.
- Baron-Cohen, S. (1987). Autism and symbolic play. *British Journal of Developmental Psychology*, 5(2), 139–148. <https://doi-org.ccl.idm.oclc.org/10.1111/j.2044-835X.1987.tb01049.x>
- Bottema-Beutel, K., Yoder, P. J., Hochman, J. M., & Watson, L. R. (2014). The role of supported joint engagement and parent utterances in language and social communication development in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 44(9), 2162–2174. <https://doi-org.ccl.idm.oclc.org/10.1007/s10803-014-2092-z>
- Cash, W. M. (1975). Training preschool children to modify their retarded siblings' behavior. *Journal of Behavior Therapy and Experimental Psychiatry*, 6, 13-16.
- Celiberti, D. A., & Harris, S. L. (1993). Behavioral intervention for siblings of children with autism: A focus on skills to enhance play. *Behavior Therapy*, 24(4), 573–599
- Chester, M., Richdale, A. L., & McGillivray, J. (2019). Group-based social skills training with play for children on the autism spectrum. *Journal of Autism and Developmental Disorders*, 49(6), 2231–2242. <https://doi-org.ccl.idm.oclc.org/10.1007/s10803-019-03892-7>

- Colletti, G., & Harris, S. L. (1977). Behavior modification in the home: Siblings as behavior modifiers, parents as observers. *Journal of Abnormal Child Psychology*, 5, 21-30.
- Ferraioli, S. J., Hansford, A., & Harris, S. L. (2012). Benefits of including siblings in the treatment of autism spectrum disorders. *Cognitive and Behavioral Practice*, 19(3), 413–422. <https://doi-org.ccl.idm.oclc.org/10.1016/j.cbpra.2010.05.005>
- Hui Shyuan Ng, A., Schulze, K., Rudrud, E., & Leaf, J. J. (2016). Using the teaching interactions procedure to teach social skills to children with autism and intellectual disability. *American Journal On Intellectual & Developmental Disabilities*, 121(6), 501–519.
- Johnson, J. E., Christie, J. F., & Wardle, F. (2005). *Play, development, and early education*. Upper Saddle River, NJ: Pearson.
- Kwon, K., Kim, E. M., & Sheridan, S. M. (2012). Behavioral competence and academic functioning among early elementary children with externalizing problems. *School Psychology Review*, 41, 123–140. <https://doi.org/10.1080/10409289.20>.
- Lee, G. T., Xu, S., Guo, S., Gilic, L., Pu, Y., & Xu, J. (2019). Teaching “imaginary objects” symbolic play to young children with autism. *Journal of Autism and Developmental Disorders*. <https://doi-org.ccl.idm.oclc.org/10.1007/s10803-019-04123-9>
- Leslie, A. M. (1987). Pretense and representation: The origins of “theory of mind”. *Psychological Review*, 94(4), 412–426. <https://doi.org/10.1037/0033-295X.94.4.412>.

- Lovaas, O. I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Consulting and Clinical Psychology, 55*(1).
- MacDonald, R., Sacramone, S., Mansfield, R., Wiltz, K., & Ahearn, W. H. (2009). Using video modeling to teach reciprocal pretend play to children with autism. *Journal of Applied Behavior Analysis, 42*(1), 43–55.
<https://doi.org.ccl.idm.oclc.org/10.1901/jaba.2009.42-43>
- Maenner MJ, Shaw KA, Baio J et. al, 2018. Prevalence of Autism Spectrum Disorder Among Children Aged 8 Years --- Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2016. *MMWR Surveill Summ* 2020;69(No. SS-4):1-12. <http://dx.doi.org/10.15585/mmwr.ss6904alexternalicon>
- Naber, F. B. A., Bakermans-Kranenburg, M. J., van IJzendoorn, M. H., Swinkels, S. H. N., Buitelaar, J. K., Dietz, C., ... van Engeland, H. (2008). Play behavior and attachment in toddlers with autism. *Journal of Autism and Developmental Disorders, 38*(5), 857–866. <https://doi-org.ccl.idm.oclc.org/10.1007/s10803-007-0454-5>
- Paynter, J., Trembath, D., & Lane, A. (2018). Differential outcome subgroups in children with autism spectrum disorder attending early intervention. *Journal of Intellectual Disability Research, 62*(7), 650–659. <https://doi-org.ccl.idm.oclc.org/10.1111/jir.12504>
- Persicke, A., Tarbox, J., Ranick, J., & St. Clair, M. (2013). Teaching children with autism to detect and respond to sarcasm. *Research in Autism Spectrum Disorders, 7*(1), 193–198. <https://doi-org.ccl.idm.oclc.org/10.1016/j.rasd.2012.08.005>

- Peterson, K. M., Piazza, C. C., Ibañez, V. F., & Fisher, W. W. (2019). Randomized controlled trial of an applied behavior analytic intervention for food selectivity in children with autism spectrum disorder. *Journal of Applied Behavior Analysis*, 52(4), 895–917.
- Pierce, H. K. (2010). Exploratory, functional, and symbolic play behaviors of toddlers with autism spectrum disorders. Dissertation Abstracts International: Section B: The Sciences and Engineering. ProQuest Information & Learning.
- Rutherford, M. D., Young, G. S., Hepburn, S., & Rogers, S. J. (2007). A longitudinal study of pretend play in autism. *Journal of Autism and Developmental Disorders*, 37(6), 1024–1039. <https://doi-org.ccl.idm.oclc.org/10.1007/s10803-006-0240-9>
- Schreibman, L., O'Neill, R. E., & Koegel, R. L. (1983). Behavioral training for siblings of autistic children. *Journal of Applied behavior Analysis*, 16, 129-138.
- Shivers, C.M., Plavnick, J.B. Sibling Involvement in Interventions for Individuals with Autism Spectrum Disorders: A Systematic Review. *J Autism Dev Disord* 45, 685–696 (2015). <https://doi.org/10.1007/s10803-014-2222-7>
- Sparrow, S. S., & Cicchetti, D. V. (1989). The Vineland Adaptive Behavior Scales. In C. S. Newmark (Ed.), *Major psychological assessment instruments, Vol. 2* (p. 199–231). Allyn & Bacon.
- Stewart, K. K., Carr, J. E., & LeBlanc, L. A. (2007). Evaluation of family-implemented behavioral skills training for teacher social skills to a child with Asperger's disorder. *Clinical Case Studies*, 6(3), 252–262.

- Thiemann-Bourque, K., Johnson, L. K., & Brady, N. C. (2019). Similarities in functional play and differences in symbolic play of children with autism spectrum disorder. *American Journal on Intellectual and Developmental Disabilities, 124*(1), 77–91.
- Tsao, L.-L., & Odom, S. L. (2006). Sibling-Mediated Social Interaction Intervention for Young Children With Autism. *Topics in Early Childhood Special Education, 26*(2), 106–123. <https://doi-org.ccl.idm.oclc.org/10.1177/02711214060260020101>
- Vaughan, C. A. (2011). Review of Childhood Autism Rating Scale (2nd ed.) [Review of the software *Childhood autism rating scale (2nd ed.)*, by E. Schopler, M. E. Van Bourgondien, G. J. Wellman & S. R. Love]. *Journal of Psychoeducational Assessment, 29*(5), 489–493. <https://doi.org/10.1177/0734282911400873>
- Walton, K. M., & Ingersoll, B. R. (2012). Evaluation of a sibling-mediated imitation intervention for young children with autism. *Journal of Positive Behavior Interventions, 14*(4), 241–253. <https://doi-org.ccl.idm.oclc.org/10.1177/1098300712437044>

Table 1. Participant Characteristics

Child	Age (yrs)	Sex	Race/Ethnicity	CARS2	Vineland
ZaAg (sibling: AnAg)	7	M	Caucasian	Severe	Moderately Low
WiCh (sibling: AlCh)	10	M	Korean- American	Mild- Moderate	Moderately Low
BrTu (sibling: MaTu)	11	M	Caucasian	Mild- Moderate	Moderately Low
AlKi (sibling: SaKi)	12	F	Korean- American	Mild- Moderate	Average
BrOh (sibling: KaOh)	14	M	Korean- American	Mild- Moderate	Moderately Low
LuGo (sibling: KaGo)	17	M	Latino- American	Severe	Moderately Low

Note. The CARS2 scores are a measure of the participant's ASD severity and the Vineland scores are a measure of the participant's social skills.

Table 2. Behavioral Skills Training Guide

Step 1. Verbal Instruction	Step 2. Modeling	Step 3. Rehearsal	Step 4. Feedback
<p>“Today we are going to learn how to play with our sibling. First, sometimes it is hard to get their attention, so let’s practice asking them to play. Show them a toy and say ‘Hey (their name), let’s play with this!’”</p>	<p>BST instructor models the verbal instruction by tapping the sibling on the shoulder and presenting them with a toy, saying “Hey, let’s play with this!”</p>	<p>“Now you try. Pretend I am (insert sibling’s name here) and try to get my attention to play.” BST instructor does not make eye contact with sibling until they pick up a toy and repeat the verbal command</p>	<p>If sibling successfully replicates the desired behavior: “Great job getting my attention!” If sibling did not fully replicate the desired behavior: “Nice job, let’s make sure we get your brother’s attention by doing this.” (provide hand over hand prompting)</p>
<p>“You’re doing an awesome job. Sometimes your sibling has a hard time sharing their toys, right? Let’s help them by first asking if you can play with the toy. If they don’t respond, offer them a new toy and switch. Now I will show you.”</p>	<p>BST instructor models the verbal instruction by first asking to play with a toy and pretending to be ignored, so picks up a new toy and offers it to the sibling saying “Here, you can play with this so I can have a turn with that toy.”</p>	<p>“Does that make sense? Now you try, pretend I am your sibling who is not sharing this toy.” BST instructor ignores sibling when they ask to play with toy and only comply when the sibling offers them a different object.</p>	<p>If sibling successfully replicates the desired behavior: “Nice work! You got me to share and now we are both happy.” If sibling did not fully replicate the desired behavior: “I know it’s hard, make sure to offer them a toy so they do not feel like you are taking theirs away. Try again!”</p>
<p>“Great job! Now let’s learn what to do when your sibling DOES do what you asked them. Whenever (sibling name) listens to you, give them a compliment or praise by saying something like ‘nice playing’ or ‘awesome job’.</p>	<p>BST instructor models giving praise to the sibling by asking the sibling to hand them a toy. Once the sibling completes the action, the BST instructor says “Awesome job playing (insert name). You are so fun!”</p>	<p>“Alright, now you try! Ask me to do something like you would to (sibling name) and let me know when I do a good job!” BST instructor follows through with what sibling asks and shows joy when they receive reinforcement.</p>	<p>If sibling successfully replicates the desired behavior: “You did it! Your brother/sister is going to want to play with you more when you talk to them nicely like this.” If sibling did not successfully replicate the desired behavior: “Keep trying, make sure your brother/sister knows that they did a good</p>

			job so that they will continue to listen to you in the future.”
<p>“Now we are going to learn how to play pretend. Your brother/sister sometimes has a hard time knowing what to do when playing pretend, so let’s help them pretend to play doctor. Tell them that we are now playing doctor and show them how to listen for your heartbeat. Once they copy you, make sure to tell them that they did a good job!”</p>	<p>BST instructor shows sibling how to demonstrate listening for a heartbeat using a pretend stethoscope. Once they demonstrate it, they tell the sibling, now it’s your turn! Do what I just did and say “Your heart sounds good!” Once the sibling complies, say “Playing doctor is so fun with you!”</p>	<p>“You’re doing amazing, now you get to teach me how to play doctor. Remember to give me instructions and show me how to do what you’re asking.” BST instructor waits for sibling to demonstrate and give a command and then follows through, waits for praise, and then shows joy.</p>	<p>If sibling successfully replicates the desired behavior: “You are such a good teacher!” If sibling did not successfully replicate the desired behavior: “Nice trying, let’s make sure you know how to help your sibling if they need help” BST instructor provides hand over hand prompting to show how to assist sibling with pretend play instruction.</p>
<p>“Isn’t this fun? Now we are going to practice how to get your sibling to play nicely, in case they are hitting you or not listening. When they are doing something annoying or unsafe, nicely ask them to stop. If they stop, make sure to say ‘good job’ right away and give them a toy or compliment to show them that not doing the mean behavior is good.”</p>	<p>“I will show you how to do this! Go ahead and bang that toy against the table. That’s not good play behavior so we need our sibling to stop. Please stop, (insert name). Once you stop, you get to play with this squishy toy (present toy). Awesome job, thanks for listening to me!”</p>	<p>“I am going to pretend to be your sibling and ‘lightly’ hitting you with this toy, try to get me to stop by using your words and giving me nice words when I do.” BST instructor lightly keeps tapping sibling with a toy until the sibling asks them to stop. Once they stop, they must be reinforced or else they will start a new undesired behavior until the sibling follows through with the verbal instruction.</p>	<p>If sibling successfully replicates the desired behavior: “Nice work! You got your sibling to stop AND play nicely!” If sibling did not successfully replicate the desired behavior: “Good trying, I know this can be hard. If they do not stop, make sure to offer them a different option, like a toy or new game to play and give them reinforcement when they stop the bad behavior.”</p>
<p>“You have done such a good job so far! Do you think you’re ready to practice with me these skills?”</p>	<p>“We are going to now play grocery store together and I am going to pretend to be your brother/sister the</p>	<p>Sibling and BST instructor play together for 5-10 minutes or so uninterrupted and</p>	<p>If they meet criterion: “Wow, you are such a good brother/sister! Thanks for playing with me and</p>

When you do a good job, then you can show your brother/sister and play with them instead of me!	whole time. Make sure to use the skills we just learned to help me play nicely with you.”	sibling practices using all of the play skills with their ‘sibling’ (the instructor).	pretending that I was (sibling’s name). Next time you can do that when you play with (sibling’s name).
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Table 3. Behavioral Skills Training

Sibling Training Behavior/Concept	Example	Was this behavior replicated by sibling at least two times during role play?
MODEL Joint Engagement: taking turns using a play item	“That toy looks fun! My turn to play, pass me the toy.”	YES or NO
MODEL Joint Engagement: imitation of a play action	“These pancakes look so good, help me flip them like this.”	YES or NO
MODEL Joint Engagement: following through on a command from play partner	“I am building a kitchen for our restaurant, please pass me a block for the stove.”	YES or NO
MODEL Symbolic play: using an item for its unintended purpose	“Wow, I am hungry. I need a plate to eat my pancakes on [grabs a frisbee].”	YES or NO
MODEL Symbolic play: engaging in activity without the physical play item	“Oh, no! The soup spilled, better clean it up [pretends to mop the floor].”	YES or NO
MODEL Symbolic play: labeling an abstract property of the play item without it physically being present	“[sniffs the air to smell smoke] Oh, no! The cake is burning, I need to take it out of the oven!”	YES or NO
REINFORCE : provide the toy back to the child after demonstrating turn taking for five seconds	“Thanks for letting me play with this fun toy, now it’s your turn again! [gives toy back for five seconds]”	YES or NO
REINFORCE : offer social praise after correct imitation of play or follow through on a command	“Wow, you are really good at flipping pancakes. Great job!”	YES or NO
REINFORCE : offer social praise after <i>attempt</i> by child at requested behavior	“[after attempt of behavior] Nice job cooking, you are working very hard!”	YES or NO

Note. Training Criterion: MUST circle YES for 8 out of the 9 Behavior/Concepts

Appendix A

Informed Consent Form: Sibling Mediated Play Intervention of Joint Engagement and Symbolic Play in Children with ASD

Your child is being asked to participate in a research project conducted by Catherine Callaci, a psychology major at Claremont McKenna College, and the Claremont Autism Center. This research is being conducted as part of my undergraduate thesis. Your child is being asked to participate because he or she has received a diagnosis of autism spectrum disorder and has a sibling who attends the Claremont Autism Center with them who does not have a diagnosis of autism spectrum disorder.

If you decide for your children to participate, they will complete multiple play sessions from January through March 2020 during their weekly session at the Claremont Autism Center, in which they will play together with predetermined toys for five minutes. The sibling of the child with ASD will also receive a separate training session from the primary investigator. In this training session, the sibling will learn to model social skills to their sibling with ASD to improve the quality of their play.

There are no anticipated risks beyond what your children usually encounter at a typical session at the Claremont Autism Center. However, there are several anticipated benefits, including increased self-efficacy and confidence in the sibling of the child with ASD, along with improved play behavior and social skills in the child with ASD.

Please understand that participation is completely voluntary. Your decision whether or not to allow your child to participate will in no way affect your or your child's current or future relationship with Claremont Graduate University, Claremont McKenna College, the Claremont Autism Center, or any of their faculty, staff, therapists, or students. You have the right to withdraw from the research at any time without penalty. You also have the right to refuse to participate in any part of the research for any reason without penalty.

The individual privacy of your child will be maintained in all publications or presentations resulting from this study. All names will be kept confidential. Only the researchers will have access to the assessment scores, videotapes, and data. All assessment scores, videos, and data sheets will be labeled with a code name and will be stored separately from your informed consent forms. All records will be kept for five years and then destroyed.

If you have any questions or would like additional information about this research, please contact us at (312) 636-2617 or via email at ccallaci20@cmc.edu. You can also contact my research advisor, Dr. Marjorie Charlop, at (909) 607-3879 or Marjorie.Charlop@ClaremontMcKenna.edu. The CMC Institutional Review Board has approved this study and its procedures. This Board is responsible for ensuring the protection of research participants, and you may also contact them at 909-621-8101 with any questions.

A signed copy of this consent form will be given to you.

I understand the above information and have had all of my questions about participation in this research project answered. I, _____, voluntarily agree to allow my child, _____ to participate in this research.

Printed Name of Participant

Printed Name of Parent/Guardian

Signature of Parent/Guardian _____ Date: _____

Signature of Researcher _____ Date: _____

Appendix B
Sibling Implementation Checklist

Session #: _____ **Date:** _____

Coder: _____ **Sibling:** _____ **Setting:** _____

Sibling Implementation Checklist (circle Yes or No)

1. Did the sibling complete (or at least attempt) one instance or more of symbolic play (using an object for its unintended use, describing a property of an object that is not present, or interacting with an object despite it not being in the immediate environment)?

Yes No
2. Did the sibling complete (or at least attempt) one instance or more of joint engagement (engaging in sharing, turn taking behavior, or imitating a play sequence)?

Yes No
3. Did the sibling attempt to play *with* the target child during the session (call them by name, engage with similar/the same toys/ideas, make eye contact, or play in close proximity)?

Yes No
4. Did the sibling engaged in these behaviors (symbolic play and joint engagement) with the specific toys instructed (plastic food or LEGOs)?

Yes No

Sibling's Implementation Score: ____ / 4

If the score is below 4 (100%), notify the researcher so that they can administer another sibling training session before the next intervention session.

Appendix C

Coding Sheet for Joint Engagement and Symbolic Play

Session #: _____ Date: _____ Coder: _____

TC: _____ Setting: _____

Time in session	Occurrence of Symbolic Play (+ means occurred, - means did not occur)	Occurrence of Joint Engagement (+ means occurred, - means did not occur)
0:00-0:15		
0:15-0:30		
0:30-0:45		
0:45-1:00		
1:00-1:15		
1:15-1:30		
1:30-1:45		
1:45-2:00		
2:00-2:15		
2:15-2:30		
2:30-2:45		
2:45-3:00		
3:00-3:15		
3:15-3:30		
3:30-3:45		
3:45-4:00		
4:00-4:15		
4:15-4:30		
4:30-4:45		
4:45-5:00		
% of Occurrences	__ / 20 =	__ / 20 =

Note. Symbolic Play is coded as a behavior that involves imagination or symbolism such as using an object for its unintended purpose, giving abstract properties to an object, or the usage of an object that is not in the immediate environment. Joint Engagement is coded as a behavior that involves acknowledgment of play partner such as eye-contact, imitation, follow through of verbal commands, turn-taking, and shared control of an object.