

Lego Games Help Young Children with Autism Develop Social Skills

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Abstract

This article aims to introduce how Lego project can help young children with autism spectrum disorder (ASD) improve social interaction and language skills and reduce challenging behaviors. A case study of a preschooler named Adam with mild ASD characteristics such as language delays, behavioral problems and lack of social interaction was introduced, followed by a detailed narration of the intervention sessions using Lego games. A series of self-developed observation checklists were used to monitor Adam's social emotional development, language development, challenging behaviors as well as fine motor skill development. After three Lego-intervention sessions Adam increases his social interactions with peers, has more eye contact, starts to share materials with his friends, expresses his interest in playing with peers, and improves his verbal communication ability. Besides Lego game, other constructive play materials also can be used to improve Adam and other young children's with ASD language skills and social competence. The Lego-intervention therapy is also beneficial to typically developing peers in that it can help the development of imagination, creativity and team work.

Keywords: Lego therapy, Young children with autism, Social skills

As a major activity in young children's life play promotes language development, cognitive, social, physical, and self-help skill development (Lin, 2010; Soundy, 2009; Tsao, 2008). Play provides young children opportunities to demonstrate skills they have mastered and to "enjoy greater flexibility and creativity" (Lin, 2010, p.462). For children with autism spectrum disorder (ASD), play is also critically important as it helps children to build social skills such as joint attention, sharing, turn taking, or following guidelines, which are imperative for language acquisition and motor imitation, prerequisite skills for academic achievement (Elksnin & Elksnin, 2000; Lin, 2010; Toth, Munson, Meltzoff, & Dawson, 2006). Play therapy has been widely used to address young children's different special needs such as building self-confidence, reducing emotional behavioral problems, and increasing social interactions (Baggerly, & Parker, 2005; Magnuson, 2003; Schottelkorb, & Ray, 2009). Lego is a perfect material for play therapy that aims to increase social interaction among young children with and without disabilities because Lego does not demand a lot of verbal communication nor does it have a specific rule as opposed to other team games such as duck, duck, goose. In addition, Lego games facilitate creativity, imagination, and collaboration, so it has been used to improve school age children's with ASD social skills and has been proved to be effective in engaging school age children and therapists in joint tasks (LeGoff, 2004). However, as ASD usually can be diagnosed at eighteen-month old, who may not have developed language abilities yet, and thus more struggle with language acquisition and have a hard time initiating social interaction with peers. There are no research that has studied this issue, so the current study aims to fill the gap to study whether Lego-based intervention can be used to improve young children's with ASD social competence. This study intends to address this issue with a focus on whether the Lego therapy helps young children especially preschoolers increase social interaction with peers, reduce their emotional behavioral problems and increase their verbal communication.

1. Adam's Story

Adam goes to the Parker preschool, a private school with approximately thirty students. It has four regular teachers and two therapists as there are two preschoolers with developmental delays including Adam enrolled at the school. So compared to other preschools the teacher student ratio is pretty high at the Parker preschool. There is project time scheduled daily and a variety of project choices are offered to the students. Although children can choose project freely during this time, each activity center is supervised by one teacher. Today the four project choices offered at the free play time are all related to the Thomas and the Friends, such as building a track for Thomas and his friends, coloring Thomas and the Friends worksheet, playing train car puzzles, or playing the Thomas the tank engine video game. Each of these four choices can allow a maximum of eight children to participate. Adams chooses building a train track today.

Thomas the tank engine is Adam's favorite toy; he likes to build tracks, play train cars, color Thomas the tank engine worksheet, and play puzzles and Thomas and the Friends video games. He also loves to listen to Thomas and the Friends stories. Diagnosed with a mild form of Autistic disorder at age three, Adam has very limited vocabulary and struggles with communicating with peers. Teachers reported he constantly disrupted class by wondering

around, not following directions, and having difficulty transitioning from one activity to the other. He only knows about 30 words and at age four he still uses one word to communicate most of the time. He lacks eye contact, and he is unable to initiate social interaction or communication with peers. At school he plays alone all the time and murmurs to himself a lot. After listening to his self-talk, teachers reported that he talks a lot to himself about the wash downs, the repaint of Thomas and his friends, or big accidents occurred at the track from the video he watched.

Adam's parents are very concerned about their son's language delay, social skill deficits and behavioral issues. Besides the therapists working with Adam to improve language abilities and social competence, the parents also hired a private tutor to foster Adam's language development. Adam's parents read a lot of books about ASD and they knew ASD is a pervasive developmental delay that affects Adam's overall development. They tried their best to meet Adam's needs. They bought Thomas the train table, Thomas the tank engine video games, T shirts with Thomas the train logo print, Thomas the train backpacks, shoes and bed for him. Many vocabularies that Adams knows are related to Thomas and his friends such as "track, train cars, engine, wash down, paint, crack and crossroad". Parents mentioned that Adam has a good memory; he can remember names of all the train cars he watched at the Thomas and the Friends DVD series such as Emily, Gordon, Spencer, Lady, Bill, Ben, Mavis, Henry and Percy; he is very engaged and remain attentive for longer time when playing toys he likes.

After the parents shared their concerns with the teachers at the Parker Preschool, the teacher seek help from the therapists and referred to his IFSP goals, and finally decided to embed the Thomas and the Friends project into the lesson and design a Lego-based intervention plan for Adam. The teachers believed the Lego-based intervention plan was appropriate for Adam because one of the neat things about playing puzzle or using Lego to build something is it doesn't require much verbal communication, which is what Adam struggled most at the moment. At the beginning of the intervention, the teachers showed Adam the Lego game and taught him how to make train cars out of Lego pieces. Then a couple of peers, who know Adam well and who are willing to play with him, were selected to join Adam at the Lego game. These selected typical developing peers were required to bring the Lego pieces to Adam and show him how to build train cars, and these peers were directed to build figures together with Adam. When they complete building a train car, the peers are required to ask Adam simple questions such as "what is the color of the train car?" "Do you like it playing this way?" or "What do you want to build next?" but Adam is not pressured to answer any of these questions if he doesn't want to. The peers then organize the next Lego project by asking "could we build Percy?" If Adam nods his head, smiles or uses gestures showing his interest, the peers will continue helping him build the next project. Below is a more detailed explanation of the three-phase Lego-based intervention session implemented to help Adam achieve his annual IFSP goals of increasing social initiation and vocabulary, and reducing behavioral problems.

2. Three-Phase Lego-Based Intervention Therapy

2.1 Rationale for Embedding Lego Games into Therapy

There are several reasons why Lego games are used to teach Adam social skills. First of all and most importantly, Adam is crazy about the Thomas and the Friends game and he likes constructive games. Secondly, Lego games do not require a lot of verbal communication between peers. Children trade pieces with each other or help each other by using simple sentences, phrases, single word or even gestures. Third, at Lego games all the children can get involved and each can work on certain parts to contribute to the team project. It is not like other group games such as “duck, duck, goose” that one team member plays at a time and the rest group members wait for their turns. Lego games constantly engage everybody. Fourth, Lego games foster creative play and spatial imagination. They are very attractive and easily engage children with autism who have language delays and behavioral issues. Children learn basic scientific knowledge through Lego play such as different sizes, weights and colors (Lin, 2010). Lastly, when play Lego games with a team of peers, “children learn to see from others’ perspectives, to take turns and share materials as well as develop abilities to organize thoughts and activities so that each person involved feels a sense of responsibility and contributes to the team” (Lin, 2010, p.463).

Teachers at the Parker Preschool embedded Lego therapy in their curricula in order to promote young children’s with and without developmental delays language, social, cognitive and fine motor skill development, and build a sense of team work. Teachers set up a Lego table for free play but also can use it as an offer for structured play. At structured play, children can be divided into small groups composed of both children with developmental delays and typically developing peers. Teachers or other professionals guided the typically developing peers to share materials with those with developmental delays and collaborate with these peers in working on a same project. At the free play, children were permitted to play the Lego games the way they liked while adults can sit beside observing the child’s with developmental delays such as ASD social, language, fine motor skills and use these data for monitoring the child’s development and designing future intervention plans.

The Lego table was placed in the corner of Adam’s preschool classroom beside the library, yet a bookshelf separates the Lego table from the library. As Adam was easily distracted by normal noises such as peers’ chatting during free play, placing the Lego table beside the library reduce distractions. When play at the Lego table everyone was required to use their inside voices. Children who played at the Lego table were also required to play quietly, so it won’t distract children reading books in the library. Another very important reason why the Lego table was arranged this way was unlike arts table, water or sand table, the Lego table can be placed far away from the water fountain and sink for it is not a messy play. At the beginning of the Lego game, Adam was provided a visual schedule showing him the daily schedule and when he can expect to play his favorite Lego games. Usually after the morning circle time and snack time. Adam was directed to the Lego table playing with the selected peers, who are more mature, socially active, and who are willing to participate in the intervention session with Adam. Before the play, one teacher went over the Lego play rules

with Adam and his peers, such as rule #1: trade and share Lego pieces at the Lego table; rule #2: use simple words or sentences to ask for help and take turns; rule #3: when done with playing, clean up Lego pieces before go to the next center; rule #4: leave the Lego table if tantrum or break any of these rules mentioned above. In order to help Adam understand these rules, a social story with illustrations was designed and presented to him while the teacher went over the rules at the Lego table. At play, the teacher prompted and demanded verbal communication during the Lego game such as “say, pass that piece, please.” Teachers also used the predesigned checklists (refer to Table 1, 2, 3 & 4) to assess Adam’s social interaction with peers, his challenging behaviors, and his language and fine motor skill development as he received the Lego intervention therapy. Below is a detailed description of the three-phase Lego-based intervention therapy that directly targets at Adam’s social skill and language improvement.

Table 1. Checklist for Social, Emotional Skill Development

items Date	Joint attention	sharing	turn taking	Social Initiation	Completing a project together with peers
Monday	Y/N	Y/N	Y/N	Y/N	Y/N
Tuesday	Y/N	Y/N	Y/N	Y/N	Y/N
Wednesday	Y/N	Y/N	Y/N	Y/N	Y/N
Thursday	Y/N	Y/N	Y/N	Y/N	Y/N
Friday	Y/N	Y/N	Y/N	Y/N	Y/N

Note: * with verbal assistance; + gestures used; - without prompt;

Table 2. Checklist for Challenging Behaviors

items Date	# of curse words used	# of pushing, kicking or biting	# of time grabbing Lego Pieces away from peers	# of crying, fussy, frustration	# of loss of attention
Monday					
Tuesday					
Wednesday					
Thursday					
Friday					

Table 3. Checklist for Language Development

items Date	# of words used	# of new vocabulary used	# of two to three-word sentences used	# of verbs used	# of phrases used
Monday					
Tuesday					
Wednesday					
Thursday					
Friday					

Table 4. Checklist for Fine Motor Skill Development

items Date	Pick Up 4 X Sized Lego Pieces	Pick Up 6 X Sized Lego Pieces	Pick Up 8X Sized Lego Pieces	Pick Up 12 X Sized Lego Pieces
Monday	Y/N	Y/N	Y/N	Y/N
Tuesday	Y/N	Y/N	Y/N	Y/N
Wednesday	Y/N	Y/N	Y/N	Y/N
Thursday	Y/N	Y/N	Y/N	Y/N
Friday	Y/N	Y/N	Y/N	Y/N

2.2 Three Phases

Since Adam is so interested and engaged in Lego games, teachers used Lego materials to design three intervention sessions for Adam. These sessions have been named as Lego Therapy. During the initial four weeks (Phase I) of Lego therapy, Adam's teachers kept daily record of Adam's performance when he played at the Lego table during the "structured" free play time. During this time the majority of the class chose toys they liked and played with peers freely, but Adam was directed to play at the Lego table with a few chosen peers. The play at the Lego table was free because it happens at the free play time but it is also "structured" because one of the teachers sat beside the table and prompted Adam to share or take turns with peers as well as the typically developing peers to communicate with Adam. The teacher shared the observation notes with Adam's parents once a week and the skills he was lacking, and the teacher provided parents instructions on how to help him learn and practice these absent skills at home.

During Phase II, the second month of the implementation of Lego Therapy, the observation checklists for language, social, emotional skills, fine motor skills as well as the behavioral issues were used as well. The teacher who supervised the Lego table reduced her verbal prompts to 1/3 of those in Phase I. Adam can play at the Lego table as long as he shared materials and took turns with peers. Gestures and visual prompt were still used in this phase and visual schedules were provided and explained to Adam ahead of time to make sure he was fully aware of the Lego table rules, and the transition time, etc. Adam still played with the two peers Jack and James because they are more mature and socially active and know him better than others. One copy of these checklists was kept in Adam's portfolio in school and the other copy was sent home.

During Phase III, the third month of the implementation of the Lego-based therapy, the supervisory teacher stopped using any physical prompts or gestures but just took notes and completed the observation checklists. A new peer was introduced to play with Adam together with other two peers who were chosen to play with Adam at the beginning of the therapy session. Neither instructions nor prompts were provided during this session except that the typically developing peers and Adam was instructed to build a project altogether. Although the visual instruction guidance map of Lego was posted beside the Lego table, Adam and his peers were free to create anything they wanted as long as they collaborated to build a project. So, during this phase, it is more like a real free play between Adam and his peers. The team

of four children including Adam always built something altogether either following the Lego guidance map or creating something themselves.

3. Results

3.1 Language Development

After the three-month therapy through Lego play Adam's vocabulary in expressive language grows from 30 to 60 words. He starts to put two words together and attends to teachers or peers at the conversation and shows understanding of their talk. He is more willing to explain what he is doing when asked. By mastering Lego related vocabularies Adam is more capable of explaining what he is doing and what he plans to build. Less frustration was observed in the final phase of the Lego-based intervention. At the end of the three-phase intervention, Adam started to use simple sentences to communicate with peers such as "Pass this, please," "This piece fits". However, he still likes to murmur to himself sometimes and ignores the peers/teachers' requests. Without physical prompts such as guided attention and facilitated sharing Adam's communication with peers were reduced in the final phase compared to the first two phases of the intervention.

3.2 Fine Motor Skill Development

Lego therapy promotes Adam's fine motor skills. Before Lego therapy, Adam was a messy writer and drawer that he ripped paper when colored or traced the alphabet letters. After the three-phase Lego therapy he is more capable of picking up small Lego pieces and put them together to make certain figures. The handle of small Lego pieces enables him to control his fingers more freely and thus hold crayons and pencils more easily. Now he less likely rips worksheets when traces letters or colors figures; he learns to zip and button himself, a big progress. Also, he can turn one page each time now as opposed to turning several pages at one time before the therapy. The improvement in fine motor skills enables him to perform certain daily basic skills such as self-feeding or cleaning up faster, which in turn promotes his independence and self-esteem.

3.3 Social Emotional Development

Before the Lego-based therapy, Adam easily became frustrated because he cannot understand what is going on, nor is able to express himself, or perform certain tasks by himself. After the therapy, Adam increases language skills and fine motor skills and thus improves his self-confidence and independence, which in turn promotes his social emotional skill development. Using simple words or sentences to trade materials to build projects with peers at the Lego table, Adam is more willing to work together with peers and less likely to play tantrum or lose attention at project time. He also increases his attention span at circle time. Teachers report his attention span increases from 0 before the therapy to 5 minutes after the therapy. The Lego-based intervention was embedded into his curricula such as story time, dramatic play time, and motor activity time. Adam made great progress in his language skills, social skills such as sharing, taking turns, and reducing tantrums during transition time. Structure is provided at both structured and free play for Adam, but it will be gradually decreased in free play time.

Table 5. Summary of Adam's Language, Fine Motor and Social Skills after Intervention

stage Skills	Before	After
language	<ul style="list-style-type: none"> ✚ Few two-word connection ✚ 30 words 	<ul style="list-style-type: none"> ✚ Simple sentences ✚ Vocabulary increase but limited to train/Lego related words
Fine motor	<ul style="list-style-type: none"> ✚ Messy writer ✚ Rip papers when color 	<ul style="list-style-type: none"> ✚ His color project gets cleaner; ✚ He can button himself; ✚ Turn one page at a time when read books.
Social emotional skills	<ul style="list-style-type: none"> ✚ Frequent tantrums ✚ No peers like to play with him; ✚ Grab toys from peers a lot. 	<ul style="list-style-type: none"> ✚ Increased interest in playing with peers; motivated ✚ Longer attention span; focus better ✚ Increased self-pride ✚ Answer questions when asked

4. Conclusion

Observations of Adam's play at the Lego table during the therapy sessions indicate an increase in his joint attention, sharing and trading of materials with peers, using simple words for communication, and interest in jointed tasks with teachers and peers (LeGoff, 2004). He is not easily getting bored or distracted by others as before, and he reduces the tantrums. Adam is more likely to pay attention to questions and use simple words to answer questions and describe what he builds, and get more involved in group work. His peers are amazed at Adam's extraordinary imagination and creativity in building Lego figures and more and more peers like to play with him. Previously, however, only very few peers are willing to play with him because it is not fun playing with somebody who doesn't like to share, who is unable to communicate, who shows disinterest in the game, and who has abusive behaviors (i.e., head banging, throwing toys at peers, etc.). Right now Adam contributes a lot to the Lego project and what he builds amazes his peers, which in turn help Adam build self-confidence and esteem among his peers. He is motivated to build something new and explain what he has done to peers at play.

5. Discussion and Implications

Both parents and the teachers at the Parker Preschool feel satisfied with his progress. Parents and the teachers decide to expand Adam's interest to other similar constructive games such as puzzle games. Actually puzzle or other constructive play materials can play the same trick as what the Lego games do to Adam and the Lego-based intervention therapy can be applied to other young children with ASD. For a very long time the Applied Behavior Analysis (ABA) has been widely used to train children with autism to develop basic routine skills by creating some artificial prompts. Similarly, involving children with ASD in playing interesting games such as Lego games with peers also creates opportunities for them to learn social cues and gain the abilities to socialize with peers. In Adam's case the teachers gradually faded the verbal, visual and gestural prompts in the play sessions so that simulate as more normal play setting as possible. Gradually the teachers also can involve Adam in playing other interesting

games and generalize the social skills he learned to other settings. Teachers also can help Adam practice his social skills by pairing him with the peers he is not so familiar with in other play sessions like the water table, and sand table. To sum up, the three phases introduced above can be generalized to other play sessions and applied to other young children with different emotional social challenges. However, when adapt the three-intervention Lego therapy sessions, teachers should choose the games or activities the child is interested in; teachers should adjust the length of time in each therapy session and the amount and frequency of prompts and rewards used in each therapy session depending on the resources available in your classroom and the severity of the child's disabilities.

Participation in the Lego therapy benefits Adam's typical developing peers as well. The peers know better of Adam's strengths and interests, and challenges, as well as factors that may lead to his frustration or distraction. Peers become more patient, cooperating and caring to Adam after the session and are more willing to approach him and make friends with him. In summary, Adam's peers develop more positive attitudes toward Adam's special needs and have a better understanding of what triggers his frustration. These positive attitudes are beneficial in an individual's entire life and play a major role in increasing public awareness, acceptance and inclusion of individuals with disabilities in our society.

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