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## An Exploration of a Community-Based LEGO® Social-Skills Program for Youth with Autism Spectrum Disorder

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### Abstract

Clinical interventions have been effective at increasing social skills of youth with autism spectrum disorder (ASD). However, generalization of those skills to non-clinical environments is often low. To reduce this generalization gap, community-based programs have been designed to help youth develop social skills in naturalistic settings. This paper describes a community-based social-skills intervention for youths with ASD aged 7–12, which was designed to build on the findings of a previous study. In this program, youths with ASD co-operated with siblings and peers in structured and unstructured play over the course of four weeks. The researchers conducted extensive observations of the play by the youths and conducted interviews with the youths with ASD, their parents, and program staff. Both in our observations and in the perceptions of the parents, the youths with ASD increased their play and socialization. Using Vygotsky's (1978) socio-cultural theory as a guiding framework, we describe the components of this intervention that contributed to the changes observed in the youths' play and social interactions. We developed a model that includes components of instruction, interest, play-based learning, and the structure of program, and which provides an explanation of intervention effectiveness to be explored in future research.

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### **Cover Page Footnote**

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### **Abstract**

*Clinical interventions have been effective at increasing social skills of youth with autism spectrum disorder (ASD). However, generalization of those skills to non-clinical environments is often low. To reduce this generalization gap, community-based programs have been designed to help youth develop social skills in naturalistic settings. This paper describes a community-based social-skills intervention for youths with ASD aged 7–12, which was designed to build on the findings of a previous study. In this program, youths with ASD co-operated with siblings and peers in structured and unstructured play over the course of four weeks. The researchers conducted extensive observations of the play by the youths and conducted interviews with the youths with ASD, their parents, and program staff. Both in our observations and in the perceptions of the parents, the youths with ASD increased their play and socialization. Using Vygotsky's (1978) socio-cultural theory as a guiding framework, we describe the components of this intervention that contributed to the changes observed in the youths' play and social interactions. We developed a model that includes components of instruction, interest, play-based learning, and the structure of program, and which provides an explanation of intervention effectiveness to be explored in future research.*

*It is 6:45 on a Wednesday evening in a mid-sized city in Ontario. Clustered on the floor of a large community hall, a group of 17 youths (mostly boys) and several young adults are sprawled out or seated on foam mats. In groups that include three youths and one young adult, the participants form circles around a pile of building blocks, a descriptive manual, and a half-constructed project. The youths are deep in concentration as they lean in closely. The youths talk casually, laugh occasionally, and when disagreements break out, order is restored through calm tones. As one youth shifts position, another unconsciously mirrors the body language of the first. One might not suspect from seeing these youth take turns, negotiate roles, and collaborate that most of them are here because they have difficulty socializing. Most of the youths have autism spectrum disorder (ASD) and usually have difficulty co-operating with peers.*

One of the diagnostic characteristics of ASD is the impairment of social skills (American Psychiatric Association, 2013). Social-skill impairments can manifest in a number of ways and are often unique to the individual. Youth with ASD may experience difficulty imitating others' gestures and faces (Lainé, Rauzy, Tardif, & Gepner, 2011), inferring mental states of others (Baron-Cohen, Jolliffe, Mortimore, & Robertson, 1997), and orienting focus to a shared object (Pruett et al., 2011). They may play less effectively than typically developing peers (Anderson, Moore, Godfrey, & Fletcher-Flinn, 2004) because they often find initiating and responding to social bids challenging (Murdock & Hobbs, 2011). They are generally less able to participate meaningfully in complex imaginative games, an inability that may limit the attention they receive from peers (Jordan, 2003).

Delays in developing social skills not only reduce the motivation for and enjoyment of interpersonal interactions but can also have long-term consequences. Early disruption of social-skill development can reduce the cognitive development of youth, making them less able to attend to caregivers' referential gestures, which can limit the effectiveness of direct instruction (Pruett et al., 2011). Due to these social delays, youth with ASD may experience deep anxiety and emotional stress (Abell & Hare, 2005). The majority of youth with ASD live on the periphery of their social circles (Kasari, Locke, Gulsrud, & Rotheram-Fuller, 2011), live in loneliness (Bauminger, Shulman, & Agam, 2003), and experience profound social isolation (Bauminger, 2002). The spiral of social exclusion means that, because youth with ASD have fewer opportunities to develop and practise social skills, their chances for success are further reduced (Bauminger, 2002).

Although clinical interventions have been shown to improve the rates of social-skill development (e.g., LeGoff, 2004), parents of youth with ASD frequently turn to community-based programs for social-skill development (Allen & Barber, 2015; Carter et al., 2004). Community-based programs provide cost-effective alternatives to clinical interventions, which often require considerable time commitments (intensive programming requires more than 30 hours per week, Koegel & Koegel, 2012; non-intensive programming requires at least 30 hours, spread over 10 to 12 weeks, Gresham, Sugai, & Horner, 2001). Unlike clinical interventions, community-based programs take place in naturalistic settings, which can increase the transfer of skills to other contexts (Altman, 1995; Koegel, Kuriakose, Singh, & Koegel, 2012). Though community-based

program designers may not always have access to clinically trained psychologists, they can rely on the findings of research conducted in clinics to inform the design and implementation of their programs (Stadnick, Stahmer, & Brookeman-Fraze, 2015).

Examining community-based programs is important because families of youth with ASD use them. Studying community-based programs can be difficult because—unlike clinical interventions which control variables like setting, attendance, and treatment—these variables are not usually controlled. Youth who participate in community-based programs are not limited to a single series of sessions, do not need to provide diagnosis at registration, and are welcome to attend at their convenience. This means that evaluations of community-based social-skill programs can be plagued with validity threats including ambiguous temporal precedence, repeated testing, maturation, and selection bias (Brewer, 2000). Rather than trying to control the elements of a community-based program, this study adopted a naturalistic, ethnographic approach and used interviews and direct observation to explore how LeGoff's (2004) clinical model can be applied in a community-based program. This allowed us to explore the salient components of the program as it was run in the community, which we acknowledge resulted in lower internal validity, but also contributed to much higher social validity than a more controlled clinical study.

### Theoretical Framework

Vygotsky's (1978) sociocultural theory describes how youth develop through their interactions with the social world. In the present study, we use Vygotsky's sociocultural theory to explore which components of a community-based social-skills program might be most salient for enhancing social skills of youth with ASD.

According to Vygotsky (1978), people develop beyond their own capacity when they receive external support—a phenomenon Vygotsky termed the *zone of proximal development*. External support, according to Vygotsky, must come from someone who is more skilled in the area of development; he called this person a *more knowledgeable other*. Another important aspect of the sociocultural theory is that learning precedes development. Learning can be understood as exposure to and engagement with new information. Development occurs when new information is given meaning; an individual may learn a new skill, but development occurs when the skill is used in a meaningful context. Analyses using Vygotsky's zone of proximal development to structure social interactions are well established in the literature (e.g., Collet, 2012).

Based on Vygotsky's (1978) sociocultural theory, the gradual release of responsibility model (Pearson & Gallagher, 1983) describes how learners move along a continuum and progress from receiving explicit instruction, to engaging in guided practice, and eventually to using the skills they learned independently. We use Vygotsky's sociocultural theory and the gradual release of responsibility model to focus on the development of social skills through the community-based program as an interaction between learners and more knowledgeable others.

## Use of LEGO® for Social-Skill Interventions

The development of the community-based program, the focus of the current study, was informed by the findings of studies conducted by LeGoff (2004). LeGoff originally developed structured social play after observing two of his clients showing mutual enthusiasm for LEGO® building blocks—the youths were socializing more effectively when playing than they had socialized in clinical trials. Determined to utilize toy-based play in his clinical intervention, LeGoff created structured play that included the use of LEGO®.

The structure of LeGoff's therapy includes three roles: the engineer, the builder, and the supplier. The engineer tells the supplier which building block is needed (which the supplier provides) and tells the builder where the block goes (which the builder places). These roles are rotated so that every youth has a chance to participate in all three roles in each session. Completing the building task requires that the youth collaborate, share joint attention, communicate, and solve problems. Youths in LeGoff's study (2004) demonstrated significant improvements in social-skill development, such as increased frequency and duration of social interactions. Youths who participated in LeGoff's therapy sessions (90 minutes of group session and 60 minutes of individual session per week, for 24 weeks) improved their social competence; and the improvements were maintained, as established through a follow-up study (LeGoff & Sherman, 2006).

The current study focuses on a community-based intervention designed to increase the social skills of youths with ASD that was modelled after the original LeGoff (2004) structure. For the sake of clarity, we refer to the current social-skill intervention as the Program. In the next section we describe the Program as the staff implemented it.

### Structured-Play Program

At the beginning of each 60-minute session, the staff (i.e., the Coordinator and young adult volunteers) welcomed the youths. The Coordinator was a community-program designer who had extensive experience working with youths with ASD. The young adult volunteers were university students with varying amounts of experience with ASD.

The Program sessions began with the youths socializing casually until they were called to Circle time. During the Circle time, the Coordinator reviewed the rules and prompted the youths to interact by asking them to tell their name and answer a simple question (e.g., "what is your favourite video game?") for approximately ten minutes. Next, the youths were placed in groups of three. The groups were formed strategically by the Coordinator to give youths opportunities to work with new peers, to minimize confrontations, and to place some youths with familiar peers, as appropriate. In groups of three, the youths engaged in structured play (25 minutes) with the help of young adult volunteer staff who guided interactions; one volunteer was placed with each group. The youths co-operated by taking turns in the roles of builder, engineer, and supplier to build a LEGO® kit (e.g., building a bulldozer kit). In the final stage (unstructured play, 25 minutes), the youths were free to choose any kit and played alone or with others.

Many aspects of LeGoff's (2004) clinical study served as direct models for the creation of the Program (e.g., rotation of the three roles, structured play followed by unstructured play, use of LEGO® as the toy, development of social skills). However, some aspects were modified. Instead of using the minimum number of sessions used by LeGoff's (24 weeks, 90-minutes per week) intervention, the Program sessions included one-hour per week for 4-week and 8-week programs that continuously cycled through the calendar year. A few weeks after one session ended, a new session would begin. The Coordinator and the parents reported that the short length and the cycle of sessions made the Program easier for families to attend. For legal reasons, the Program allowed parents to be present in the room, even though LeGoff recommended against this practice. Finally, the Program included youths with comorbid diagnoses and challenges relating to behaviour, anxiety, and attention deficits, although LeGoff's study did not include such participants.

By focusing on the Program, the current study answers a call by the research community (LeGoff, 2004; LeGoff & Sherman, 2006) to describe the most salient components of LeGoff's structured play intervention. Although the Program we observed differed from LeGoff's clinical work, it represents how clinical findings are applied in community-based programs. Community-based programs have been increasingly valued for spearheading effectiveness research and offering a promising approach for broad outreach. While efficacy research conducted in clinical settings serves to evaluate the impact of isolated variables, community-based programs utilize grassroots participation to strengthen multiple variables using a range of strategies (Wandersman & Florin, 2003). The transfer of clinical innovations to program delivery through research-informed community-based programs serves as a promising bridge between efficacy and effectiveness research (Altman, 1995). The Program highlighted in the current study was designed to take place in natural settings so that the skills required to participate would be transferable to other social environments (e.g., Koegel, Kuriakose, et al., 2012). Studying community-based programs, like the four-week program highlighted in the current study, may provide useful insights into the components of structured play interventions by describing their application in natural settings.

## **Method**

### **Participants**

The Program we studied included 17 youths, 12 of whom had a diagnosis of ASD (three with a comorbid diagnosis of attention deficit hyperactivity disorder). Of the five youths who did not have ASD, one youth had a diagnosis of cerebral palsy, and four were typically developing siblings of the youths with disabilities. All of the participants were male, with the exception of one typically developing participant. The ages of the youths ranged from 7 to 12 years. The diagnoses of ASD were made by clinical psychologists or specialist diagnosticians. The ages of the youths at the time of diagnosis of ASD ranged between 3 and 10 years. Four pairs of youths were siblings. Many of the youths had participated in the Program in at least one previous session, as it runs cyclically throughout the year. Participants in this study also included nine mothers of the youths

and six staff members: five unpaid volunteers and one paid Coordinator, all of whom were interviewed. The young adult volunteers ranged in age from 22 to 30 years (two were graduate students in the field of ASD; three were undergraduate students in fields unrelated to ASD) and had been involved in sessions prior to the session highlighted in the current study. The Coordinator was a qualified early childhood educator with more than 20 years of experience as an educator and program designer for youths with ASD. The observation data and interview data were collected by the research team in the building where the program was held, in a mid-sized city in Ontario. The research team consisted of two researchers and two research assistants, all graduate students in fields related to education. At the first session, informed consent was obtained from parents and staff, and informed verbal assent was obtained from the youths. The study had been cleared by a university ethics review board. To protect the anonymity of the participants, pseudonyms are used throughout.

## **Procedures and Analyses**

The purpose of the current study was to describe the application of LeGoff's clinical model (2004) in a community-based program and to identify the most salient components of the Program. We gathered information using two data sources: observations and interviews. We chose the methodology of ethnography to gather information in the environment while the Program was taking place. Data analysis was an iterative process whereby the researchers constantly referred back to the interview transcripts and observation notes. The process of aligning several sources of data helped to triangulate the findings insofar as possible.

Prior to the observations, the research assistants were trained on observational guidelines (Nind, 2008) by the researchers. Those guidelines emphasized the importance of (a) considering the ethical complexities of observing participants with disabilities, (b) viewing participants as socially competent social beings, and (c) interpreting subjective meanings. The research team sat about 2 metres away from the youths and took notes during the program. To record observational notes, the research assistants were instructed to begin with comprehensive note-taking strategies and move to salience-hierarchy strategies as described by Wolfinger (2002). Immediately after each session of the Program, the research team met to discuss the content of the recorded observations. Those meetings were audiotaped and transcribed for analysis.

The method of interviews was chosen to provide the perspective of the youths, the staff, and the parents. The method of interviews (Mack, Woodsong, MacQueen, Guest, & Namey, 2005) presupposes the value of the participants as stakeholders in the collaborative work with researchers. The research assistants conducted brief semi-structured interviews with the youths at the end of the last session, but did not receive informative data. Because the youths spoke little in the interviews, the researchers made the decision to omit these data from the analyses.

The interviews with staff and parents were conducted using semi-structured interview guidelines. The interviews with the young adult volunteers were conducted prior to the intervention, based on previous sessions in which they had been involved. The interviews with the parents were conducted during the final two sessions of the

Program. The Coordinator was interviewed after the Program had been completed. The interviews were conducted by the researchers based on an interview protocol as recommended by Mack et al. (2005) which includes: (a) rapport-building, (b) perspective, and (c) adapting to emotional states. The interview of young adult volunteers included three areas of discussion: personal information, training and experience, and perceptions of the Program. The semi-structure of the interview guide for the parents included four areas of discussion: personal details (process of diagnosis), social-skills abilities of youths, play abilities of youths, and perceptions of the Program. The interviews were audiotaped and transcribed verbatim for analysis. Over 30,000 words of transcribed data were produced from interviews.

We analyzed transcripts of the interviews and observational notes with Atlas.ti version 7 software using a constant comparative method (Boeige, 2002). Using an exploratory method, two researchers conducted the first round of coding independently by attaching descriptive phrases to units of text. The coding results were compared and differences in opinion were resolved through discussion. Over 120 unique coding phrases were used at this stage. The researchers aggregated the descriptive phrases by topic and collaborated to produce preliminary code definitions. The researchers employed a qualitative approach to reliability, which included the creation of seven code definitions through negotiation and tracing back to the original observational notes or text file when necessary to reach consensus. The code definitions were used to conduct a second round of coding. The researchers sorted and evaluated thematic codes and affiliated units of text to identify their theoretical value using descriptive methods, and used discussion to explore biases and settle disagreements. The researchers plotted seven thematic codes on a spectrum of implicit to explicit impact: indirect instruction, direct instruction, competence of staff, interest-based play, play-based learning, social bids by role, and phenomenon of three. During the final stage of analysis, during the drafting of this paper, the thematic codes were collapsed into four themes: (a) indirect instruction, direct instruction, and competence of staff were merged to form the theme *instruction*; (b) *interest-based play* remained a theme on its own; (c) *play-based learning* remained a theme; and (d) social bids by role and phenomenon of three merged to form the theme *structure of the Program*.

## Findings

To describe the change in behaviour over the course of the program, we have included two vignettes, or “snapshots,” of Liam, an 11-year old youth with ASD (all names are pseudonyms). The first snapshot is from Liam’s life prior to participating in the Program and was described by his mother as typical of Liam’s ability to socialize with peers. The second snapshot is from observational notes made during the third session of the four-session social-skills intervention.

**Prior to the Program:** Liam’s mother reports that she knows that Liam wants to have friends but he is not sure how to initiate or sustain meaningful interactions. He accompanies his mother when she visits an acquaintance who has a son Liam’s age. When the acquaintance’s son greets Liam, Liam does not reply. He makes funny faces and then asks, “Why are you looking at me like that?” Later, at home, he becomes emotional when telling his mother that he has no friends.

**During the Program:** Liam is in the same building group as Derek, an 11-year youth with ASD. At first, the two boys interact only so far as required by their assigned roles, but soon they are engaging with each other with sustained eye contact and verbal exchanges. While they play, Liam shows Derek every block he is adding, and the two boys comment to each other on the structures they are building. Both boys are laughing and building for each other's enjoyment. At the next week's session, Liam seeks out Derek. When the Coordinator asks, "Who wants to build the four wheeler?" Liam puts up his hand and raises Derek's hand saying, "I do, and Derek wants it too!"

The contrast between these snapshots exemplifies the type of change in behaviour that parents reported, and we observed, over the course of the Program. As we discovered, Liam's experience was not unique. Consistent with the purpose of this study, we report here the components of the Program that emerged from our analysis and that may support changes in behaviour like those we report for Liam.

The results of the interviews demonstrated that the parents believed that the Program was effective. Specifically, parents told us that the Program helped to teach social skills such as initiations: "He will [initiate socially] more so now than he used to." They also reported that the Program helped youths to develop meaningful friendships: "He does talk about the other kids ... he [wants] to come." While the perceptions of parents may not constitute robust empirical evidence, their perspectives should not be dismissed. Families of youths with ASD are highly motivated to help their children develop and do not invest time in ineffective programs. It is not surprising that the parents reported that they perceive the social skills developed within the Program as meaningful because spending time with other youths and playing co-operatively generally have high social validity (Hurley, Wehby, & Feurer, 2010). It is important to verify that parents perceive the outcomes as valuable (Bellini, Peters, Benner, & Hopf, 2007; Cunningham, 2012).

An analysis of the data revealed four components that may support changes in social behaviour of the youths involved in the Program: (a) instruction, (b) interest-based play, (c) play-based learning, and (d) structure of the Program.

## **Instruction**

Based on our observations and reports from staff and parents, effective programming requires direct and indirect instruction from competent staff.

**Indirect instruction.** To create a cohesive environment that fosters social development, play-based social-skill programs require a minimum level of attention to task, co-operation, and collaboration, among other skills (LeGoff, 2004). By modelling, guiding, and mentoring social interactions, the young adult volunteers increased the social cohesion within the groups. The volunteers encouraged the interactivity of the youths. Members of the research team, acting as observers, noted that the volunteers were the "glue" that kept group play from separating and dissolving into independent play. Without the volunteer present, one researcher noted that "it would have been completely [independent] play." When confrontations arose within a group, the volunteers gently refocused the attention of the youths. In her interview, the Coordinator shared some of the prescribed dialogue she encouraged the volunteers to use:

And when the kids are getting goofy, [the volunteers will] say, “Come on quit messing around. I’m here to build LEGO®. What do you come here to do? Are you here because you want to do this? I thought you came to build LEGO® with us.”

Typically developing peers also provided indirect instruction as they modelled appropriate behaviour for the youths with ASD. Parents attributed the Program’s success to having behaviour models among the other youths. One mother reported: “It’s a really good way to see how other kids do [it]. He’s very much a watcher. He’ll watch what everyone else is doing there.” The appropriate behaviour demonstrated by peers allowed the youths with ASD to understand and imitate socially acceptable behaviours. The Coordinator explained her decision to include typically developing siblings as peer mentors by saying:

Peers display typical behaviour for the kids on the spectrum.... Having the siblings there who already have a child in their home on the spectrum, [they] tend to have better language. They talk [the] lingo. A lot of times, they already know the phrases to say. Give me the ... Pass me the ... Show me that ... These are phrases that we used to prompt [appropriate behaviour] ... So they become little instructors.

**Direct instruction.** Direct instruction was necessary when the structure and support provided by volunteers and peers were not enough for the youths to regulate emotion in stressful situations. In situations of extreme emotion, the youths could become overwhelmed and leave the group. During two observed incidents, a youth with ASD spoke loudly in an argumentative tone, slapped the floor, tossed the toys down, and left the group. The Coordinator helped the youth identify the issue, solve the problem, and return to the group. To reach this end, the Coordinator reported she used a four-step strategy: (a) reduce the tension, (b) brainstorm solutions, (c) role-play strategies, and (d) reintegrate into the social environment.

I wanted him to work it through. So we talked about Bakugan® [a game many of the youth played outside of the intervention]. [I asked,] “Do you play [a] game with it?” [He answered,] “Yes, I do play with it.” “Does that game have rules?” “Well, yeah.” “Then explain the rules to the game.” [So he did.] And I said that this game has rules too. They’re both games ... That’s how I got him back to go to the group. [He] had to talk to the other boy. “I know you have to apologize, but you also tell him why you were upset.” We talked it [through]. We role-played it twice. We did it.

**Competence of staff.** Interviews with parents revealed a shared belief that the competence of the Coordinator and of the volunteers was important for the Program’s success. The Coordinator had extensive experience working with individuals with ASD, regularly demonstrated her understanding of the youths’ needs, and consistently enforced the rules and the structure of the Program. She reported that she was often called the “boss” or “principal” and that she led a strong group of volunteers who worked closely with each group of three youths. She felt that her strengths included responding effectively to the parents and volunteers as well as to the youths with ASD and their siblings: “I need someone, like me, strong. Strong to deal with parents, and the volunteers, and the kids.”

There was no one way for a volunteer to facilitate a group; the volunteers used a range of strategies to facilitate co-operation within their respective groups based on the

needs of the members of each group. In their interviews, parents praised the positive influence of the volunteers: “They’re knowledgeable. Empathetic. I don’t know if it would run smoothly without the [volunteers] in it. Because it could be very chaotic. It could be very stressful for the kids.”

### **Interest-Based Play**

We found that when youths with ASD engage in activities based on their interests, they are able to sustain their participation and to benefit from the Program. In the Program, the youths were motivated to play with the LEGO® toy. Our observations suggest the toy is an effective modality because the youths were interested in playing with it, thereby increasing their inherent motivation, and the toy’s range of use. The LEGO® toy is engaging and encourages creativity, but also offers structure for purposeful play. The Coordinator explained “LEGO® has ... what we like to call closed-ended activity: with the beginning and an end. You start [with] the picture and you end with the product.”

Parents reported that their youths loved playing with LEGO® toys. Even though their youths might “drag their feet” (Parent, Interview) when going to other clubs, the youths were eager to attend a program that offered play with an interesting toy and a guiding purpose from start to finish. Many of the parents spoke of LEGO® as a “shared interest” and as a “currency” between friends or within families.

Part of the effectiveness of the toy was how co-operation is integral to play. To construct the object, youths were required to combine their efforts and interact with each other. All of the youths reported having the toy at home but were drawn to the Program because they were sharing the toy with others. Although the youths found LEGO® engaging and co-operated to build the kits, there were a few occasions when co-operation broke down. Breakdowns in appropriate social behaviour were seen most often after elements of competition had been introduced during structured games or free play. As one parent explained:

I love seeing him co-operate ... [with] his LEGO® classmates. It’s thrilling to see that because his attention span is quite short when learning a new activity at home. I’m thrilled to see him engaged and enjoying himself here. And paying attention. It’s encouraging. I don’t always see that.

### **Play-Based Learning**

In the Program, play was provided in two formats: structured play and non-structured play (free play). During the structured play portion early in each session, youths were required to co-operate with their peers to assemble an object. All group members had to fulfill their roles and co-operate with their peers in order to complete the activity. The co-operation during the structured play portion of each session allowed youths to become comfortable working with their peers and following the rules of play. As the sessions went on, the youths increasingly were able to transfer social skills learned during structured play to the free play, which occurred near the end of each session. The Coordinator described the difference between the first and last sessions:

I think it's how they interact together. Like I was saying, there's a big difference between the first couple of sessions [when they] really don't know each other, where they just want to build things apart, [and] you have to tell them to play with a partner. And then by the end of the [series of sessions] they go to groups by themselves. They'll play together on their own. And I think that's the success. We want them to initiate the social interaction.

In addition to play being the focus for participants, a paramount feature of the program was the way that play rules translated into social rules. The Coordinator described the transferability of play skills for social interactions:

You work on [play and social skills] at the same time. Some kids are working on play skills. How to play cars. How to put it down and how to roll the car back and forth. But he does it with a peer. Because peers are a big part of that. They may take turns putting it down. The social [skills are] the skills that you learned to play ... I think the two go together. I think the two *have* to go together.

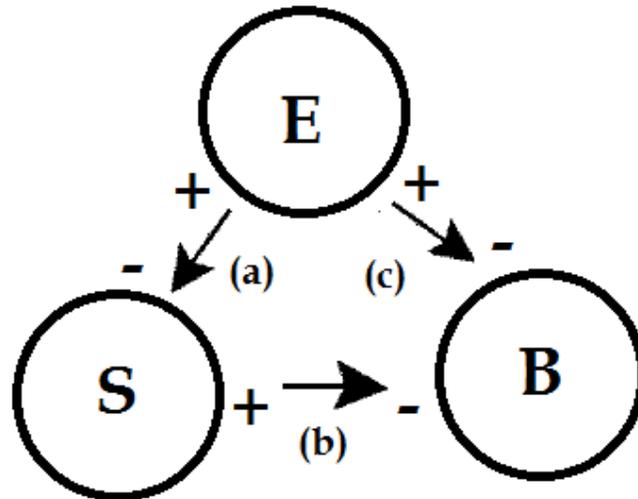
The process of negotiating the order of roles (e.g., who will assume the role of builder first) provides an authentic opportunity for the youths to practise negotiation. At first, the youths may only be able to keep calm and be patient, but as they develop, they are more able to negotiate, take turns, and collaborate. By framing social skills as play skills, youths developed skills such as patience and turn-taking while engaging in inherently interesting activities. The Coordinator explained:

[Youths] want to be the builder first. So how are we going to do that? You can do all different kinds of things. You can pick a number. You can't bargain at the beginning but you can later. The kids have to build the skill before you can bargain for builder first ... They understand how that works. Some kids who like to build will say, Okay, I hope to be the builder second, you be the builder first. We'll say, "Don't worry. Your turn is coming, it's only 10 minutes."

## **Structure of the Program**

As we observed the social roles within the groups, we noticed that the structured play provided a sequence of social initiations and responses. The three stages of the social sequence require an initiation and a response: (a) engineer tells the supplier what block is required, (b) supplier gives the block to the builder, and (c) the engineer tells the builder where to place the block (see Figure 1). To differentiate between initiations and responses, we used polarity symbols: initiations (+) and responses (-). The role of the engineer (+/+) involves two initiations because the engineer initiates with the supplier and also with the builder. The role of the supplier (+/-) responds to a initiation from the engineer and initiates with the builder. The role of the builder (-/-) responds to both the engineer and the supplier, and is not required to make any initiations. Being able to initiate social exchanges is a skill that, if learned and practised in natural settings, leads to more successful social interactions (Barakova, Bajracharya, Willemsen, Lourens, & Huskens, 2014).

**Figure 1.** The Exchange of Social Bids by Role



*Figure 1.* The roles of engineer (E), supplier (S), and builder (B) engage in dyad interactions involving initiations (+) and responses (-) during steps a, b, and c of the structured play.

**Phenomenon of three.** The social sequence, as depicted in Figure 1, is based on a dyad model of interaction. At each step of the social sequence, two group members interact while the third waits. That in-out model of participation provides a constant cycle of participation, exclusion, and reintegration. The process affected the physicality of the groups. The youths altered their seating positions to accommodate the social sequence. One observer noted: “In my group I noticed that two boys sat [legs folded] facing each other [to complete their roles] and the [third] would be very much on the outside. Physically on the outside.”

Parents considered these social sequences to be somewhat uncomfortable for the youths, but the process of having to constantly reintegrate into the social exchange was considered by adults in the various roles—parents, observers, and staff—to be a valuable practice. One parent explained it by saying:

I think the best part is the socialization with other kids. I think the structure and being with different groups each time. It’s beneficial for him. Being forced to interact with other people. Being forced to do that. The more we can force these social interactions, the better.

In short, the distinct roles (builder, supplier, engineer) required the youths to constantly reintegrate into the social sequences thereby practising important social skills such as initiating and responding to social exchanges.

## **Discussion**

For the majority of the families in this study, community-based programs will be the closest they get to clinical interventions. While community-based programs may not have all of the advantages of clinical settings, many program designers incorporate evidence-based strategies into accessible programs to teach skills that have high social validity. Community-based programs have an important role for many families of youths with ASD (Stadnick et al., 2015). Purposeful programming is important for youth with ASD because unstructured play alone does not provide opportunities to practise social bids. According to the parents, unstructured activities do not lead to interactive, social play. In the words of one mother, her son does not develop socially when participating in unstructured activities: “[He] tries to play with ... his friends but he usually ends up chasing them.... He can’t handle any of it.” The message from the interviews and our observations has been consistent: The value of this program is in its design. Our goal has been to explore the components within one community-based program based on observations, so that we can describe the components that best support the changes in behaviour.

**Socially valid outcomes.** Designing accessible, affordable programming that develops social competence among youth with ASD is fundamentally difficult because researchers do not subscribe to a universal definition of social competence and do not agree on how to teach or measure it. The types of outcomes that are important to parents and youth with ASD—the ability to make and maintain friendships, co-operate with others, and socialize meaningfully with peers—are valuable (Hurley et al., 2010) but are not easily measured or improved in the short term. The challenge of social-skill interventions is to help youth develop measurable skills that are also socially valuable (Bellini et al., 2007; Cunningham, 2012). Program designers should ask parents to verify that the skills being taught are useful. Spending time in social interactions with peers and co-operating during play activities are usually rated as valuable by parents and youth (Hurley et al., 2010). If the goals of and outcomes achieved by community-based programs are not perceived as valuable, parents will not continue to enrol their children.

**Instruction.** One of the keys to effective program design is the inclusion of direct and indirect instruction provided by competent staff (Banda & Hart, 2010). In the case of this program, we observed that the volunteers fostered and sustained meaningful interactions among the group members beyond serving as models themselves, and encouraged typically developing peers to act as models for the youths with ASD. As in prior research (Ogilvie, 2011; Sperry, Neitzel, & Engelhardt-Wells, 2010; Trembath, Balandin, Togher, & Stancliffe, 2009), the use of peer mentors within a highly structured and purposeful format was particularly effective. The use of peer mediation has also been well documented in the literature (Choi, 2007; Kamps, 1997; Morrison, Kamps, Garcia, & Parker, 2001). In Vygotsky’s (1978) socio-cultural theory, he identifies the presence of a more knowledgeable other as being necessary for individual growth within the zone of proximal development. With supportive modelling, guiding, and mentoring by staff and typically developing peers, youths with ASD were able to engage in social interactions they could not have accomplished independently. Adult and peer mentors working to refocus the youths are not enough to foster independence. The youths also had to be able to self-monitor and self-regulate. The importance of such self-appraisal to achieve social

skills has been demonstrated in previous studies (Goldstein & Naglieri, 2013; Soares, Vannest, & Harrison, 2009). The volunteers and the peer models encouraged self-evaluation of the goals and of the means to achieve them.

**Skill development and practice.** When youth with ASD experience difficulty socializing, an easy assumption may be that the youth need to learn social skills to compensate. Acquisition deficits are not the only reason why youth with ASD find socializing problematic (e.g., Koegel, Vernon, Koegel, Koegel, & Paullin, 2012). According to Gresham (1981), they may also have difficulty socializing because of performance and fluency deficits. High-functioning youth with ASD, such as the youths highlighted in this study, may have the skills they need but not perform them (performance deficits) or not perform them adequately (fluency deficit; Bauminger-Zviely, 2013). When programs are designed to include opportunities to practise social skills with dynamic and constant feedback (Gresham, 1981), youth with ASD have better opportunities to demonstrate their skills (e.g., interacting with a robot humanoid; Barakova et al., 2014).

**Interests.** Even with the supports provided by the Program, learning and practising social skills, like making initiations, can be difficult for youth with ASD, who may show low motivation for the tasks. Despite these challenges, we observed, and the parents reported, that the youths were engaged with the program and highly motivated to participate. According to the staff and the parents, the youths were motivated to participate because the activities included objects and activities that are particularly interesting to them. Interventions and programs designed with a consideration of the interests of the youths have been shown to improve cognitive and behavioural progress (Campbell & Tincani, 2011; Dunst, Trivette, & Hamby, 2012). Simply stated, research is beginning to show that, when the interests of the youth with ASD are included as an integral part of the intervention, youth with ASD seek educational situations (Koegel, Kuriakose, et al., 2012; Otero, Schatz, Merrill, & Bellini, 2015).

**Game-based activities.** Incorporating game-based activities is effective for social-skill interventions because, when instruction is structured and direct (Wolfberg, 1999), the use of games appears to rectify lack of social imagination (Chung, Vanderbilt, & Soares, 2015; Kryzak, Bauer, Jones, & Sturney, 2013). Games can compensate for deficits such as lack of social cohesion (Lin, 2010). Not only do youth with ASD usually enjoy playing, but the rules of the games can also be aligned to mirror social rules (Lin, 2010; Pang, 2010; Tanaka et al., 2010; Wong, Morgan, Crowley, & Baker, 1996). This means that game-based activities are promising venues for community-based programming, especially when the activities are designed to specifically mimic critical social skills.

In the cases of LeGoff's study (2004) and the Program highlighted in this study, learning to initiate and respond to social interactions was encoded into the play. We observed that the youths preferred the builder role: "What I saw time and time again through the night, each boy liked to have the builder role. Whether that was structured play or free play." At first, we presumed they preferred the builder role because the builder is the only role that actually handles the toy. On closer analysis, we realized their preferences were based on how many social initiations were required within each role.

The role that required the fewest initiations, the builder, was the most preferred. The role that required the most initiations, the engineer, was the least preferred. This finding aligns with previous studies that showed that making social initiations is difficult to teach (Jones & Carr, 2004; Taylor & Hoch, 2008). Initiations are also closely related to social competence (LeGoff, 2004) and, for this reason, initiations are often used as a test of social competence (e.g., Barakova et al., 2014).

## **Implications for Practitioners and Researchers**

Based on our observations and interviews with parents and staff, we recommend that programs incorporate objects and activities of interest as well as elements of play as much as possible. Incorporating interests in play-based activities is not enough to help youth develop the complex skills that are required to socialize effectively. The findings of this study suggest that programs should also include: (a) structured play followed by free play, (b) interactions that require the initiation of social bids, and (c) development of self-regulation through peer modelling and instruction that includes gradual release of responsibility to the youths. It is important for researchers to continue to investigate how each component contributes to outcomes of the intervention and which of these components are most critical to increase social skills, so that community-based interventions can become simpler and more efficient to implement while remaining effective. When exploring the application of clinical research in community-based programs, it may be helpful to align the components of the program to specific social-skill deficits. For example, the five subscales reflected in the Social Responsiveness Scale Version 2 (i.e., social awareness, social cognition, social communication, social motivation, and restricted interests and repetitive behaviour; Constantino & Gruber, 2012) may represent different deficits which require unique program components. Program designers may be able to improve the effectiveness of community-based programs if the individual social deficits of the participants are considered when choosing program components.

## **Limitations**

In the current exploratory study, the use of qualitative methods was appropriate to further our understanding of the nature of the intervention through direct observation and interviews. However, future studies would benefit from the adoption of a program evaluation methodology to conclusively demonstrate the effectiveness of this Program. The current findings assume that the results of LeGoff's (2004) clinical study can be generalized to community-based programs. Even though interviews with the staff and parents support the idea that this Program is effective as a social-skill intervention, this assumption may limit the findings. A further limitation of this study was that it relied entirely on the viewpoints of female parents and included only male youths with ASD. However, the primary caregivers who brought the youths to the Program were mothers, and the youths who were enrolled in the program were males. Previous studies on the experience of parents of youth with disabilities also have more often included the viewpoints of mothers than of fathers (Woodgate, Ateah, & Secco, 2008). This is a limitation common to research in the larger field of exceptional education.

## Conclusions

The focus we put on Liam's experiences helps us to put a *face* to the type of learning that happened in the structured play Program. Liam's successful social interactions may have felt like child's play to him, but they included sophisticated social skills. Our understanding of how interventions like these work is improved when the intervention is framed by Vygotsky's (1978) learning theories. In particular, the transition from role play to free play structures in the Program exemplifies the gradual release of responsibility approach to teaching play skills. Youths are given the opportunity in the latter part of each session to use these skills with less structure and less support from the staff and the peer mentors.

Besides skill development, many youth with ASD require opportunities to practise the skills. Community-based programs can be useful forums for practice because they can include motivating activities in settings that resemble natural social settings. In the case of the Program highlighted in this study, youths with ASD developed the skills they need as they practised social skills with immediate and dynamic feedback within interesting play activities that were structured to require socialization. In particular, this study provided a closer look at the role of interests in social-skill interventions for youths. Without the inherent draw of the LEGO® toys, the youths would not likely submit themselves to the complex roles, such as the role of engineer, which involves the least amount of contact with the toy and requires the highest level of social bid initiation. This study sheds light on the congruity of play skills and social skills. In instances such as this Program, play skills go further than fostering social skills; play skills are social skills.

## References

- Abell, F., & Hare, D. J. (2005). An experimental investigation of the phenomenology of delusional beliefs in people with Asperger syndrome. *Autism, 9*, 515–531. doi:10.1177/1362361305057857
- Allen, K. B., & Barber, C. R. (2015). Examining the use of play activities to increase appropriate classroom behaviors. *International Journal of Play Therapy, 24*, 1–12. doi:10.1037/a0038466
- Altman, D. (1995). Sustaining interventions in community systems: On the relationship between researchers and communities. *Health Psychology, 14*, 526–536. doi:10.1037/0278-6133.14.6.526
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: Author.
- Anderson, A., Moore, D. W., Godfrey, R., & Fletcher-Flinn, C. M. (2004). Social skills assessment of children with autism in free-play situations. *Autism, 8*, 369–385. doi:10.1177/1362361304045216
- Banda, D. R., & Hart, S. L. (2010). Increasing peer-to-peer social skills through direct instruction of two elementary school girls with autism. *Journal of Research in Special Education, 10*, 124–132. doi:10.1111/j.1471-2.2010.01149.x
- Barakova, E., Bajracharya, P., Willemsen, M., Lourens, T., & Huskens, B. (2014). Long-term LEGO therapy with humanoid robot for children with ASD. *Expert Systems*. Advance online publication. doi:10.1111/exsy.12098
- Baron-Cohen, S., Jolliffe, T., Mortimore, C., & Robertson, M. (1997). Another advanced test of theory of mind: Evidence from very high functioning adults with autism or Asperger syndrome. *Journal of Child Psychology and Psychiatry, 38*, 813–822. doi:10.1111/j.1469-7610.1997.tb01599.x

- Bauminger, N. (2002). The facilitation of social-emotional understanding and social interaction in high-functioning children with autism: Intervention outcomes. *Journal of Autism and Developmental Disorders*, 32, 283–298. doi:10.1023/A:1016378718278
- Bauminger-Zviely, N. (2013). *Social and academic abilities in children with high-functioning autism spectrum disorders*. New York, NY: Guilford.
- Bauminger, N., Shulman, C., & Agam, G. (2003). Peer interaction and loneliness in high-functioning children with autism. *Journal of Autism and Developmental Disorders*, 33, 489–507. doi:10.1023/A:1025827427901
- Bellini, S., Peters, J., Benner, L., & Hopf, A. (2007). A meta-analysis of school-based social skills interventions for children with autism spectrum disorders. *Remedial and Special Education*, 28, 153–162. doi:10.1177/07419325070280030401
- Boeige, H. (2002). A purposeful approach to the constant comparative method in the analysis of qualitative interviews. *Quality & Quantity*, 36, 391–409. doi:10.1023/A:1020909529486
- Brewer, M. (2000). Research design and issues of validity. In H. Reis & C. Judd (Eds.), *Handbook of Research Methods in Social and Personality Psychology* (pp. 11–26). Cambridge, UK: Cambridge University Press.
- Campbell, A., & Tincani, M. J. (2011). The power card strategy: Strength-based intervention to increase direction following of children with autism spectrum disorder. *Journal of Positive Behavior Interventions*, 13, 240–249. doi:10.1177/1098300711400608
- Carter, C., Meckes, L., Pritchard, L., Swensen, S., Wittman, P., & Velde, B. (2004). The friendship club: An after-school program for children with Asperger syndrome. *Family Community Health*, 27, 143–150. doi:10.1097/00003727-200404000-00007
- Choi, S. H.-J. (2007). Peer training methods for children and adolescents with autism: A review. *International Journal of Pedagogies and Learning*, 3, 92–100. doi:10.5172/ijpl.3.3.92
- Chung, P., Vanderbilt, D., & Soares, N. (2015). Social behaviors and active videogame play in children with autism spectrum disorder. *Games for Health Journal: Research, Development, and Clinical Applications*, 4, 1–10. doi:10.1089/g4h.2014.0125
- Collet, V. S. (2012). The gradual increase of responsibility model: Coaching for teacher change. *Literacy Research and Instruction*, 51, 27–47. doi:10.1080/19388071.2010.549548
- Constantino, J. N., & Gruber, C. P. (2012). *Social Responsiveness Scale—Second Edition (SRS-2)*. Torrance, CA: Western Psychological Services.
- Cunningham, A. (2012). Measuring change in social interaction skills of young children with autism. *Journal of Autism and Developmental Disabilities*, 42, 593–605. doi:10.1007/s10803-011-1280-3
- Dunst, C. J., Trivette, C. M., & Hamby, D. W. (2012). Meta-analysis of studies incorporating the interests of young children with autism spectrum disorders into early intervention practices. *Autism Research and Treatment*, 2012, 1–10. doi:10.1155/2012/462531
- Goldstein, S., & Naglieri, J. A. (2013). *Interventions for autism spectrum disorders*. New York, NY: Springer. doi:10.1007/978-1-4614-5301-7
- Gresham, F. (1981). Assessment of children's social skills. *Journal of School Psychology*, 19, 120–134. doi:10.1016/0022-4405(81)90054-6
- Gresham, F., Sugai, G., & Horner, R. (2001). Interpreting outcomes of social skills training for students with high-incidence disabilities. *Exceptional Children*, 67, 331–344.
- Hurley, J., Wehby, J., & Feurer, I. (2010). The social validity assessment of social competence intervention behavior goals. *Topics in Early Childhood Special Education*, 1, 1–13. doi:10.1177/0271121409359426

- Jones, E. A., & Carr, E. G. (2004). Joint attention in children with autism: Theory and intervention. *Focus on Autism and Other Developmental Disabilities, 19*, 13–26. doi:10.1177/10883576040190010301
- Jordan, R. (2003). Social play and autistic spectrum disorders. *Autism, 7*, 347–360. doi:10.1177/1362361303007004002
- Kamps, D. M. (1997). Peer mediation approaches for children and youth with autism and developmental disabilities: An introduction to the special series. *Focus on Autism and Other Developmental Disabilities, 12*, 194–195. doi:10.1177/108835769701200401
- Kasari, C., Locke, J., Gulsrud, A., & Rotheram-Fuller, E. (2011). Social networks and friendships at school: Comparing children with and without ASD. *Journal of Autism and Developmental Disorders, 41*, 533–544. doi:10.1007/s10803-010-1076-x
- Koegel, R., & Koegel, L. (2012). *The PRT pocket guide*. Baltimore, MD: Paul H. Brookes.
- Koegel, L., Kuriakose, S., Singh, A., & Koegel, R. (2012). Improving generalization of peer socialization gains in inclusive school settings using initiations training. *Behavior Modification, 1*, 1–17. doi:10.1177/0145445512445609
- Koegel, L., Vernon, T., Koegel, R., Koegel, B., & Paullin, A. (2012). Improving social engagement and initiations between children with autism spectrum disorder and their peers in inclusive settings. *Journal of Positive Behavior Interventions, 14*, 220–227. doi:10.1177/1098300712437042
- Kryzak, L., Bauer, S., Jones, E., & Sturmey, P. (2013). Increasing responding to others' joint attention directives using circumscribed interests. *Journal of Applied Behavior Analysis, 46*, 674–679. doi:10.1002/jaba.73
- Lainé, F., Rauzy, S., Tardif, C., & Gepner, B. (2011). Slowing down the presentation of facial and body movements enhances imitation performance in children with severe autism. *Journal of Autism and Developmental Disorders, 41*, 983–996. doi:10.1007/s10803-010-1123-7
- LeGoff, D. B. (2004). Use of LEGO<sup>®</sup> as a therapeutic medium for improving social competence. *Journal of Autism and Developmental Disorders, 34*, 557–571. doi:10.1007/s10803-004-2550-0
- LeGoff, D. B., & Sherman, M. (2006). Long-term outcome of social intervention based on interactive LEGO<sup>®</sup> play. *Autism, 10*, 317–329. doi:10.1177/1362361306064403
- Lin, Y.-C. (2010). Improving parent-child relationships through block play. *Education, 130*, 461–469.
- Mack, N., Woodsong, C., MacQueen, K. M., Guest, G., & Namey, E. (2005). *Qualitative research methods: A data collector's field guide*. Durham, NC: Family Health International.
- Morrison, L., Kamps, D., Garcia, J., & Parker, D. (2001). Peer mediation and monitoring strategies to improve initiations and social skills for students with autism. *Journal of Positive Behavior Interventions, 3*, 237–250. doi:10.1177/109830070100300405
- Murdock, L., & Hobbs, J. (2011). Picture me playing: Increasing pretend play dialogue of children with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 41*, 870–878. doi:10.1007/s10803-010-1108-6
- Nind, M. (2008). *Conducting qualitative research with people with learning, communication and other disabilities: Methodological challenges*. Southampton, UK: National Centre for Research Methods.
- Ogilvie, C. R. (2011). Step by step: Social skills instruction for students with autism spectrum disorder using video models and peer mentors. *Teaching Exceptional Children, 43*, 20–26. doi:10.1177/004005991104300602

- Otero, T., Schatz, R., Merrill, A., & Bellini, S. (2015). Social skills training for youth with autism spectrum disorders: A follow up. *Child and Adolescent Psychiatric Clinics of North American*, 24, 99–115. doi:10.1016/j.chc.2014.09.002
- Pang, Y. (2010). Lego games help young children with autism develop social skills. *International Journal of Education*, 2, 1–9. doi:10.5296/ije.v2i2.538
- Pearson, P. D., & Gallagher, M. C. (1983). The instruction of reading comprehension. *Contemporary Educational Psychology*, 8, 317–344. doi:10.1016/0361-476X(83)90019-X
- Pruett, J., LaMacchia, A., Hoertel, S., Squire, E., McVey, K., Todd, R., ... Petersen, S. (2011). Social and non-social cueing of visuospatial attention in autism and typical development. *Journal of Autism and Developmental Disorders*, 41, 715–731. doi:10.1007/s10803-010-1090-z
- Soares, D. A., Vannest, K. J., & Harrison, J. (2009). Computer aided self-monitoring to increase academic production and reduce self-injurious behavior in a child with autism. *Behavioral Interventions*, 24, 171–183. doi:10.1002/bin.283
- Sperry, L., Neitzel, J., & Engelhardt-Wells, K. (2010). Peer-mediated instruction and intervention strategies for students with autism spectrum disorders. *Preventing School Failure*, 54, 256–264. doi:10.1080/10459881003800529
- Stadnick, N., Stahmer, A., & Brookeman-Fraze, L. (2015). Preliminary effectiveness of project impact: A parent-mediated intervention for children with autism spectrum disorder delivered in a community program. *Journal of Autism and Developmental Disorders*. Advance online publication. doi:10.1007/s10803-015-2376-y
- Tanaka, J. W., Wolf, J. M., Klaiman, C., Koenig, K., Cockburn, J., Herlihy, L. ... Schultz, R. T. (2010). Using computerized games to teach face recognition skills to children with autism spectrum disorder: The Let's Face It! program. *Journal of Child Psychology and Psychiatry*, 51, 944–952. doi:10.1111/j.1469-7610.2010.02258.x
- Taylor, B. A., & Hoch, H. (2008). Teaching children with autism to respond to and initiate social bids for joint attention. *Journal of Applied Behavior Analysis*, 41, 377–391. doi:10.1901/jaba.2008.41-377
- Trembath, D., Balandin, S., Togher, L., & Stancliffe, R. J. (2009). Peer-mediated teaching and augmentative and alternative communication for preschool-aged children and autism. *Journal of Intellectual & Developmental Disability*, 34, 173–186. doi:10.1080/13668250902845210
- Vygotsky, L. S. (1978). *Mind and society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Wandersman, A., & Florin, P. (2003). Community interventions and effective prevention. *American Psychologist*, 58, 441–448. doi:10.1037/0003-066X.58.6-7.441
- Wolfberg, P. J. (1999). *Play and imagination in children with autism*. New York, NY: Teachers College Press.
- Wolfinger, N. H. (2002). On writing fieldnotes: Collection strategies and background expectancies. *Qualitative Research*, 2, 85–95. doi:10.1177/1468794102002001640
- Wong, S. E., Morgan, C., Crowley, R., & Baker, J. N. (1996). Using a table game to teach social skills to adolescent psychiatric inpatients: Do the skills generalize? *Child & Family Behavior Therapy*, 18, 1–17. doi:10.1300/J019v18n04\_01
- Woodgate, R. L., Ateah, C., & Secco, L. (2008). Living in a world of our own: The experience of parents who have a child with autism. *Qualitative Health Research*, 18, 1075–1083. doi:10.1177/1049732308320112

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